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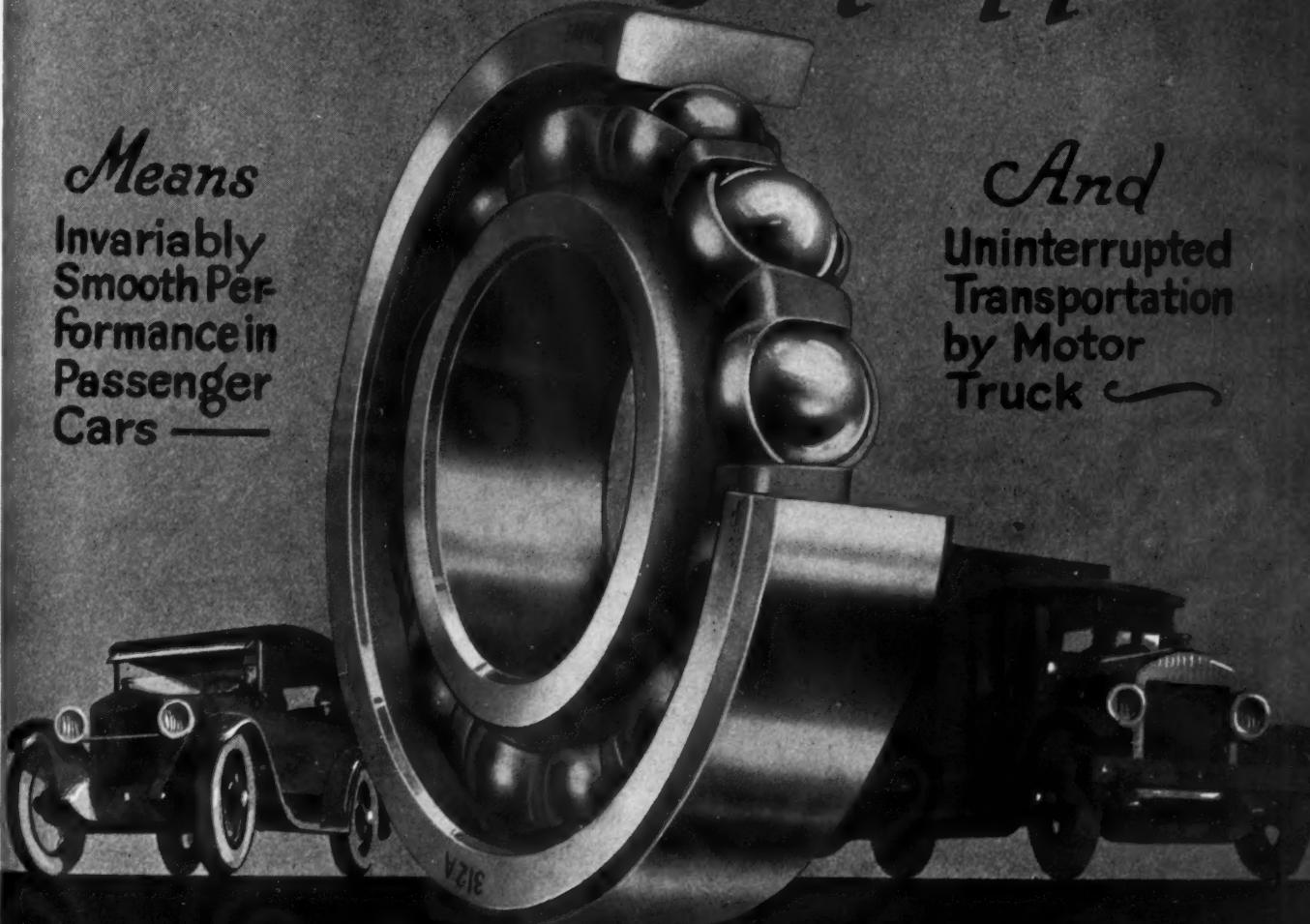
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AUTOMOTIVE INDUSTRIES

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VOL. 51

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No. 26

National View of Traffic Safety Needed, Hoover Meeting Shows

Accident conference asks modified "full stop" law. Avoids question of compulsory insurance. Car design changes suggested.
Problem arouses Nation's chief executive.

By Norman G. Shidle

LIKE a tank corps driving steadily forward through gun fire and over trenches, a vast array of practical suggestions for making the highways safer emerged triumphant from the barrage of oratorical perambulations which provided laughter and tears for the four hundred delegates who gathered in Washington, December 15 and 16, to participate in Herbert Hoover's National Conference on Street and Highway Safety.

Encouraged by the President of the United States in person, sponsored by the Secretary of Commerce, and supported by business and public organizations representing hundreds of thousands of citizens, this meeting may mark a new era in the study and handling of traffic and safety problems.

At least it signified two things:

1. The traffic accident problem has reached such enormous proportions as to demand national attention.
2. Action is being sought by the highest officials of the government.

Fresh from this gathering, whose deliberations resulted in very marked progress toward reducing the appalling toll of highway accidents, it is difficult to consider only the cold facts which were developed, because the meeting itself developed more human interest than any gathering of a purely business character in many years.

It will be a long while before the delegates forget the impassioned appeal of the Gentleman from Ohio in favor of compelling motor vehicles to come to a full stop before going over a grade crossing. Only infrequently have the halls of Congress or other politi-

cal citadels resounded with more rhetorical booming or heard language of more picturesque fervor than that which was cast about the big meeting hall of the new U. S. Chamber of Commerce building.

Nor will the final oration of the Gentleman from Georgia quickly pass from the minds of those who listened to the story of the darky who fell off a log, while they wondered whether or not they were going to make the 5 o'clock train. The frequent interpolations of a Gentleman from New York concerning this, that and the other, and the striking resemblance of the chairman—noted by George M. Graham—to Lord Balfour, all combined to give the ordinary business man a practical idea of how it must feel to be a member of Congress or the House of Commons.

But it was a good meeting. It produced results.

Despite the oratorical flim-flam which enlivened several of the sessions, a constructive program covering 30 typewritten sheets was adopted item by item, the delegates received a clear understanding of the human as well as the mechanistic side of the safety problem, and definite coordination of various safety activities was accomplished in a two-day session.

The conference was called by Secretary of Commerce Herbert Hoover "for the purpose of determining the essential facts and promoting better organization and coordination of activities in the reduction of accidents." It included police officials, motor vehicle commissioners, insurance companies, railroad and street railway companies, safety councils, chambers of commerce, labor unions, women's clubs, auto-



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"The automobile is no longer a luxury—it is a complete necessity. It has added recreation, efficiency and vision to the American people.

"It is here to stay, and to stay in constantly increasing numbers."

—Herbert Hoover.

mobile associations, automobile manufacturers and various other national groups.

From a strictly automotive standpoint, two recommendations which failed of adoption were of the most importance.

Approval of a law compelling vehicles to come to a full stop before going over a grade crossing and approval of compulsory automobile liability insurance were the two proposals which the conference would not go on record as favoring.

Automotive opinion at the meeting was opposed to incorporation of these proposals in the recommendations of the conference, although it favored the modified form of stop law resolution which finally was passed. In both cases, however, strong opposition was generated among other groups as well.

Serious differences arose over the full stop measure. C. L. Bardo of the New Haven Railroad offered the proposal that the conference go on record indorsing full stop laws.

Frank Page, Highway Commissioner of North Carolina, opposing this proposal, declared that the law "does not prevent accidents." He said the reduction of accidents in North Carolina was due to the elimination of 308 grade crossings since 1921. He said that he is in favor of submitting a proposition to the railways that "when the highways carry more people across a given highway crossing than the railroads, the railroads stop their trains."

Full Stop Law Debated

The proposed indorsement was objected to also by H. W. Baker of the New York State Automobile Association, who declared that the stop law would seriously impede highway traffic in that State.

C. E. Rueh of the Public Utilities Board of Kansas, citing the experience of Oklahoma, declared at length that the measure would save lives. His position was supported by E. R. Cott of the Ohio Association for the Prevention of Grade Crossing Accidents, and W. T. Anderson of the State Highway Board of Georgia.

F. T. Singleton, of the Indiana Public Service Commission, offered as an alternative to Mr. Bardo's proposal, a suggestion that there should be placed in the hands of State authorities the power to designate dangerous crossings at which motorists must stop.

This position was indorsed by C. E. Hill of the New York Central Lines, who declared that "we are here to protect those unable to help themselves," and who cited figures of 400 persons killed and 1100 injured by running into the side of moving trains.

H. G. McKennon of the Norfolk & Western Railway discussed at length the value of the stop law, declaring among other things that if North Carolina enforced its stop law, previous statements about its efficiency would be disproved.

Final adoption of the modified resolution on the full stop law came immediately after George N. Graham had spoken in favor of it. His approval resulted in withdrawal by Mr. Bardo of his original proposal and the Singleton compromise went through with the approval of all interests.

No Stand Taken on Insurance

Omission of the compulsory insurance proposal meant simply that the conference did not care to go on record as either favoring or opposing this measure. The motion to incorporate such a proposal in the recommendations was defeated by an overwhelming majority after a brief debate, without any automotive spokesman having given his views.

Practically all of the other recommendations embodied in the consolidated report which was submitted to the conference on the second day went through without argument, except as to minor details. The consolidated report, in turn, bore strong resemblance to the committee reports on which it was based, differences being evident only as regards relatively unimportant questions.

This conference, it will be remembered, was the culmination of several months' effort which began when Mr. Hoover first asked representatives of the various organizations to meet and talk over the possibility of deriving benefit from coordination of effort. As a result of that first meeting, eight committees were appointed to investigate and prepare recommendations as regards the eight main phases of the highway traffic problems. These committees were:

1. Statistics
2. Traffic Control
3. Construction and Engineering
4. City Planning and Zoning
5. Insurance
6. Education
7. The Motor Vehicle
8. Public Relations

"WITH the deplorable and continuing increase in highway accidents mortality and injury the time is highly appropriate for a comprehensive study of the causes, that we may have proper understanding of conditions and so may intelligently provide remedies.

"The evil is so widespread as to be of national concern and we do well to look at it with a country-wide vision."

—Calvin Coolidge.



Automotive executives played an important part in the work of these committees and rendered their full share of service in developing the ideas contained in the final report. Henry M. Crane and George M. Graham served as chairmen of the committees on the Motor Vehicle and Public Relations respectively, while many other executives had a share in furthering the work of the preliminary committees.

The first day of the conference was devoted to general discussion of these preliminary reports. Argument arose as regards the full stop law and several other points, but no great headway was made. At the end of the first day each of the groups represented in the conference met separately and chose a member for a central steering committee. This steering committee, in conjunction with the chairmen of the various preliminary committees, met during the evening and drafted the consolidated report, which formed the basis of detailed consideration the second day.

Uniformity of Laws Urged

While serious differences of opinion arose only on the two points mentioned, general agreement on all the other items can be attributed rather to the careful work done by the committees than to any lack of difference of views among the various groups.

Among the most important ideas developed by the conference were:

1. Uniformity in laws, regulations, signs and markings, is extremely important if real progress toward reduction of accidents is to be made.

2. Considerable emphasis must be placed on punitive measures, strict law enforcement, and physical alteration of hazardous conditions. Education must be an important part of the program, but it will be an assistant rather than a principal.

3. Conflicts which may arise as the result of differing opinions on the questions involved will be fought in defense of ideas—not of selfish interests. A spirit of genuine cooperation was evidenced time and again throughout the sessions when discussion arose on points at which the interests of groups were very definitely at variance.

Of the multitude of recommendations included in the consolidated report some fifteen or twenty items appear which are of special interest.

There is, in the opinion of the conference, a tend-

ency to include far too much detail in legislation. "This not only divides responsibility," the report says, "but also hinders progress. Laws should be so drafted as to include only those features which must be authorized by legislation, leaving the great mass of detailed regulations to be prescribed by the responsible officials whose orders should, within the limits fixed by the statute, have the effect of law."

The report carries out the idea, expressed by Mr. Hoover in opening the conference, that the function of the Federal government in relation to safety should be one of encouragement, of distribution of information, and development of best practices.

Further recommendations regarding legislative matters urge:

1. That every police department have an adequately manned traffic division whose major function shall be traffic safety work.
2. Elimination of grade crossings as "the only perfect solution of the grade crossing problem." Recognizing that such a program can be carried out only very slowly, it is recommended that the question be given careful attention by the proper authorities; that such crossings be avoided in future construction and that "properly designated State commissions be empowered to designate dangerous grade crossings at which motorists must stop."
3. Establishment of special traffic courts, both city and rural.
4. Examination of drivers before granting of licenses.
5. Regulation of speed of vehicles should be directed primarily at reckless driving and should be uniform throughout the country so far as practicable.
6. All States should adopt the principle of certification and registration of automobile titles as one of the most important and effective means for reducing thefts.

Car Design Changes

Other sections of the report made detailed suggestions regarding education, playgrounds, city planning and other matters of importance in the general safety movement.

An entire section of the report was devoted to the motor vehicle and included several recommendations regarding automobile design and construction. The most important of these follow:

Brakes. Pending the adoption by constituted authorities of a code for standard braking ability, all

motor vehicles, except possibly motorcycles and heavy trucks, should be capable by means of the service brake alone of stopping in a distance of not more than 50 feet from a speed of 20 miles per hour on a dry, smooth, hard-surfaced road free from any loose material.

Emergency brakes should be capable of the same performance as service brakes, but as an absolutely minimum requirement they should be capable of holding the vehicle on any grade which it can ascend.

Steering Gears. Lost motion or play in steering gears should be limited to about 15 degrees. The toe-in of front wheels should never exceed five-eighths of an inch.

Lights. Present lighting regulations should be more rigidly enforced as a necessary beginning in arriving at any improved night-driving condition on the highways.

The study of proper road illumination, combined with the minimizing of undesirable glare, should be given immediate further consideration with a view to determining whether it may not be possible to improve the regulations now in force.

Driver Vision

Driver Vision. Design of bodies and cabs should be carried out with due regard to the necessity of reducing to the minimum the shut-off area of driver vision.

The use of all posters or other obstructions to vision on the front windows or on the windshield should be avoided.

Motor Vehicle Width. The overall width of body chassis and loads of any motor vehicle should be limited to 96 inches.

Inspection and Maintenance. Loading beyond the rated capacity of any vehicle should be prohibited. In the interest not only of safety but of economy of operation, adequate and periodic inspection, adjustment and repair of motor vehicles is absolutely essential.

To this end there should be prepared a simple and practical inspection chart and code applicable to all makes of motor vehicles, giving particular attention to items affecting safety. To promote its general acceptance, it is recommended that this chart and code, when prepared, be issued by the Department of Commerce.

Automobile Manufacturers. Automobile manufacturers are urged to give attention to the following suggestions:

The engine accelerator pedal should be located at a sufficient distance from the brake pedal to minimize the danger of applying the accelerator when intending to actuate the foot brake. The brake pedal should be so constructed as to minimize the danger of the driver's foot slipping from it when he wishes to actuate the foot brake.

In vehicles in which it is intended that the accelera-

tor pedal and the brake pedal shall be operated by the same foot, the movement of the foot from the accelerator to the brake pedal should be as easy and direct as possible.

Motor vehicles should be so designed as to permit braking with the engine on severe grades without injury to any of the mechanical parts.

Plea for Better Brakes

Service brakes should be so constructed as to be capable of simple and safe adjustment by the operator throughout the life of the wearing parts.

Ratchets of handbrakes should be so designed and constructed as to have greater durability and certainty of operation, so that they may give efficient service throughout the life of the vehicle.

The design and construction of motor vehicles should be such that unintended lubrication shall not reach the braking surfaces.

Some device for cleaning the windshield from rain and snow that can be conveniently operated by the driver should be available for use when windshields cannot be kept open or a clear vision secured by other means.

The portion of the windshield in front of the driver should be made so it can be readily opened by the driver if weather conditions require it to afford proper vision.

The question of mirror design and location for purposes of rear view should be studied.

A study of the use of bumpers as a safety device should be undertaken in the near future. When bumpers are used the height of the center line above the road surface should be standardized so far as conditions will permit.

Need for better analysis of accidents, reporting of accidents, and compilation of accident statistics was emphasized throughout the meeting and it seems likely that the next twelve months will see considerable improvement in the results achieved along this line.

The delegates were received by President Coolidge on the second day of the conference. The President gave his indorsement to the meeting and the work in which it was

engaged. He said that the problem is so large and so serious as to necessitate nation-wide treatment and stated his belief that Federal authorities should lose no opportunity to modelize best experience so that it may be made available to all. He believes, however, that solution of the problem lies in State, not in national, action.

In opening the conference Mr. Hoover made several important statements. He said in part:

"The automobile is the greatest development of twenty years, both economically and socially. But if we wish for its fullest development we must reduce its terrors. In these aspects I have found a most gratifying unity of opinion."

ACCIDENTS can't be prevented until complete accurate records are available as to number, character and cause.

The Hoover conference stressed this point.

Progress toward better reporting and analysis of traffic accidents is to be expected during the next twelve months.

"The automobile is no longer a luxury—it is a complete necessity. It has added recreation, efficiency and vision to the American people. Probably 75 per cent of our people participate in its use. It is here to stay, and to stay in constantly increasing numbers.

"If it has brought about the present traffic conditions so quickly that we have been unable to cope with it, if our roads and streets were laid out for other purposes and are inadequate to the situation, then it is fitting and proper that the public officials, the transportation interests, the business interests, the motorists, and those engaged in the business of alleviating suffering should gather together to assist in straightening out the tangle.

"And it is high time that something should be done about this. We must find constructive measures to meet the crisis of tens of thousands of deaths annually, with hundreds of thousands of serious personal injuries, and millions of property damage, accompanied by an economic loss of some staggering sum, such as \$600,000,000 yearly.

Responsibility Is Widespread

"It is impossible to put the whole blame for the deplorable conditions upon any particular individuals or any particular classes of traffic. If we were to analyze the facts presented to the conference as to the causes of this enormous death roll and injury we would find that incompetence, carelessness, and recklessness are the largest of the contributors to this ghastly toll.

"We would find in a lesser degree the lack of preventive measures.

"We would find a considerable contribution from confusion over the regulations in force.

"We would find also that prevention of accidents are in part involved in large problems of difficult solution in the planning of our cities, the construction of highways, and generally the handling of these new traffic problems that have been thrown upon cities and country wholly unplanned for such use.

"There are three broad methods of approach to remedy. First, through prevention and safeguard, and second, through much stronger punishment for violation of the rights of others; third, through public education as to its responsibilities."

Automotive Men Attend

Automotive executives attending the meeting included: J. I. Farley, president, Auburn Automobile Company; David S. Ludlum, president, and W. H. Brearley, Autocar Company; A. B. Cummer, vice-president, Autocar Sales & Service Company; F. C. Chandler, president, Chandler Motor Car Company; Sidney H. Hale, Denby Motor Truck Company; R. A. Shaw and Warren C. Eynon, Ford Motor Company; R. M. Kincaid, Garford Motor Truck Company; Roy D. Chapin, Hudson Motor Car Company; A. J. Brosseau, Mack Trucks, Inc.; Carl H. Gets, Maxwell Motor Corp.-Chrysler Motor Corp.; D. C. Fenner and Russell Huffman, Motor Vehicle Conference Committee; John C. Long, National Automobile Chamber of Commerce; G. M. Williams, Nordyke & Marmon Company; Walter C. Boynton, Olds Motor Works; P. J. Wells, Pierce-Arrow Motor Car Company; R. H. Scott,

Reo Motor Car Company; Paul Moore, Service Motors, Inc.; C. F. Clarkson, Society of Automotive Engineers; A. R. Erskine, Studebaker Corp.; Charles A. Ward, Ward Motor Vehicle Company; H. L. Horning, Waukesha Motor Company; Walter C. White, White Company, and J. N. Willys, Willys-Overland Company.

Problems and Province of Automobile Analyzed

HOW many men who spend eight hours every day in work which contributes to the production or sales of automobiles have a well-defined, broad vision of what the motor vehicle really means to modern social and economic life?

How many understand clearly the very definite problems which have come with the automobile?

Important executives in every plant are familiar with the fundamentals of these problems. But working under them, probably are thousands of men whose ideas on all of these topics are the result only of casual reading or of conversations dealing with some small phase of these various questions; men with capable minds, whose efforts naturally have been bound up in their immediate tasks, but whose value as automotive workers would be increased if they had a better understanding of the principles involved in these major problems, the details of which must be the concern of specialists.

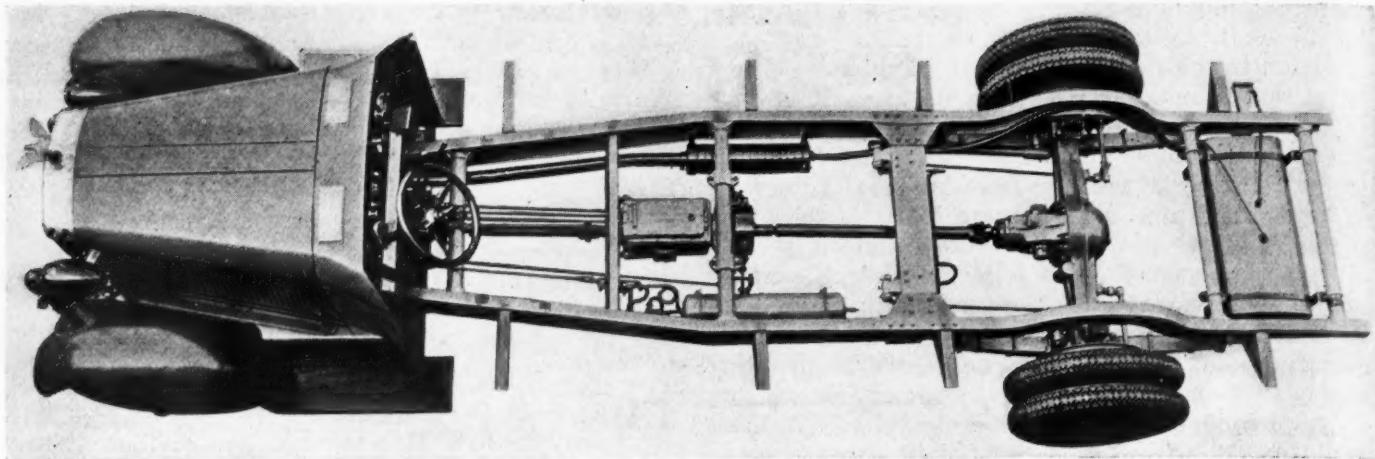
The November issue of the *Annals of the American Academy of Political and Social Science*, which is devoted entirely to "The Automobile, Its Province and Problems," should go far toward clarifying the rather jumbled conceptions which inevitably have arisen in the minds of men only incidentally interested in the broader phases of the automotive business. The significance of this volume to the automotive industry is not so much in the freshness of the material presented as in the clarity with which the information is set forth and in the fact that it all is made available in a single book of less than 300 pages.

The volume contains forty-nine articles, grouped under nine main headings. Under "Services of the Automobile" are articles showing what the automobile has meant to the industrial life of the country. The section labeled "Manufacture and Sales of Automobiles" contains one article dealing with the effect of automatic machinery on automotive workers and two on financing automobile sales. This section is one of the best in the book, since it furnishes clear, unbiased outlines of two much argued topics.

Other sections deal with the influence of the automobile on the home, school and church; building and financing of highways; city plans for motor traffic; international aspects; and the service of the automobile to associations.

A large part of the information will not be new to those who have followed closely the educational work of the National Automobile Chamber of Commerce. Roy D. Chapin, Alfred H. Swayne, John C. Long, Charles Clifton, George M. Graham, J. Walker Drake and Alfred Reeves have summarized in this volume the ideas on automotive progress which they have outlined previously, each discussing that phase of the business on which he has come to be recognized as an authority. The articles prepared by the representatives of the industry all are interesting and should further materially the task of giving to thinking men outside the automobile business a true picture of automotive development.

To almost every automotive man, however, the volume is likely to bring a number of ideas which are new.



New Schacht bus chassis with ten-speed gearset mounted in center of frame. The latter has five nickel-steel tubular cross members and kickup over rear axle

Schacht Enters Bus Field with Low Hung Chassis Having Ten-Speed Gearset

Components include new Wisconsin six-cylinder engine and double reduction rear axle, Shuler front axle and Westinghouse brakes acting on all four wheels. Frame has five tubular cross members.

ANOTHER truck manufacturer has taken up the production of six-cylinder low hung pneumatic tired bus chassis designed for high speed interurban traffic. This is the G. A. Schacht Motor Truck Co. of Cincinnati, Ohio, which recently has announced the Schacht "Super Safety" Coach.

This newcomer in the bus field is not a truck chassis modified for passenger carrying purposes, but is designed especially for passenger carrying service. Although it follows more or less conventional lines in general design, this new bus has certain unusual features, the most important of which is the use of a gearset having eight forward and two reverse speeds. This gearset has two speed ranges, the lower one giving ratios from 4.75:1 to 1:1 and the higher ratios from 3.35:1 to 0.705:1. From this it will be seen that the top speed in the higher range is over-gearred to permit of high bus speed without excessive engine speed.

Power is furnished by a Wisconsin type-Z six-cylinder bus engine, a description of which is given in following pages.

Reference to the accompanying cut makes it apparent that a stiff and low frame structure is a prominent feature of the design. The frame is a Parish & Bingham product and has kicked-up side members which are formed from $8\frac{1}{8} \times 2\frac{3}{4} \times \frac{1}{4}$ in. channels to which outriggers are attached. These side rails are joined by five nickel steel tubes brazed and pinned to suitable end castings which are riveted in place. There are two other cross members, one of which supports the forward end of the amidship gearset and the second of which is at the forward end of the rear springs. This is well gusseted and serves to support the air diaphragm housings which form a part of the braking system.

Mounted near the center of the chassis is a hand operated propeller shaft brake, the anchorage for which is

supported from one of the five tubular cross members which carries also the rear end of the gearset. Beside this brake is the air reservoir, which is filled from a compressor mounted on the engine.

The frame is narrowed from the center forward and at its front end is attached to Gruss air springs designed to promote easy riding. Front springs are 42 in. long by 3 in. wide, while those in the rear are underslung and measure 60 x $3\frac{1}{2}$ in. Front springs are clipped to the drop center I-section front axle, which is a Shuler product and is equipped with brakes designed for air operation.

Housings for the air diaphragms which operate the front brakes are attached to brackets which in turn are fastened by clips to the upper portion of the yokes of the Elliot type axle ends. On the outer ends of the brake plungers are split wedges which straddle the elongation of the axle pivot pin and engage with tapered surfaces so that outward motion of the wedge forces these surfaces and connecting parts upward, thus applying the internal brake bands.

How Brakes Are Actuated

Rear brakes are operated by levers and pull rods actuated by the plungers of the air diaphragms, the housings of which are attached to the frame. These brakes are also of the expanding type. The total area of the brakes operated through the usual pedal controlling the Westinghouse air valve is given as 882 sq. in. As indicated above, the hand brake operates on the propeller shaft drum. It has a bearing area of 96 sq. in.

A model 1300-K-3 double reduction full-floating Wisconsin rear axle with 6 to 1 gears is employed. This axle carries dual Budd-Michelin disk wheels on which are mounted 36 x 6 in. pneumatic tires. The same size of tires are used on front wheels. Radius rods made from tubing formed after the fashion of the conventional drag

link with ball ends are employed, but torque is taken by the rear spring. The forward ends of the radius rods are pivoted on brackets carried by the frame cross member which is just forward of the front end of the rear springs. The drive from the gearset is through a shaft fitted with two Blood Brothers universal joints. The shaft connecting the front end of the gearset to the Fuller multiple disk clutch also has two universal joints.

Steering is by Ross cam and lever gear mounted at the left side of the frame, with the column incline as in conventional practice. Gearset control levers are mounted in the center of the chassis frame and are connected to the gearset shifter forks by four tubular pull rods.

Cooling is effected by a Wheeler fin and tube type radiator core with cast aluminum top and bottom tanks which give an effective appearance to the front of the vehicle. E. & J. special bus lamps are mounted on

brackets which extend from the side members of the radiator. A Leece-Neville starting and lighting system with voltage regulator and a Robert Bosch magneto is used.

Fuel is fed to the Zenith carburetor by vacuum tank from the 35-gal. supply tank which is carried in a cradle between the two rearmost cross members of the frame. An Alemite chassis lubricating system is provided.

This chassis is intended to carry a body seating 27 passengers. It has 201 in. wheelbase and an overall length of 282 in. Overall width is 91 in. Front tread 67½ in. and rear tread 84¾ in. or 91¼ in. outside tires. Turning radius is given as 33½ ft. and chassis weight with tanks filled as approximately 6400 lb., of which about 63 per cent is on rear wheels. Distance from dash to end of frame is 221½ in. and from dash to center of rear axle 162½ in. This chassis lists at \$5,900.

Cowdrey Brake Testing Machine Simplifies Problem of Equalization

A TESTING machine for use in making brake adjustments has been developed by the C. H. Cowdrey Machine Works, Fitchburg, Mass. It comprises an electric motor of comparatively small size, with gearing suitable for developing on a shaft extending from both sides of the machine a torque sufficient to overcome the friction of brakes when applied to their drums by means of a patent pedal depressor.

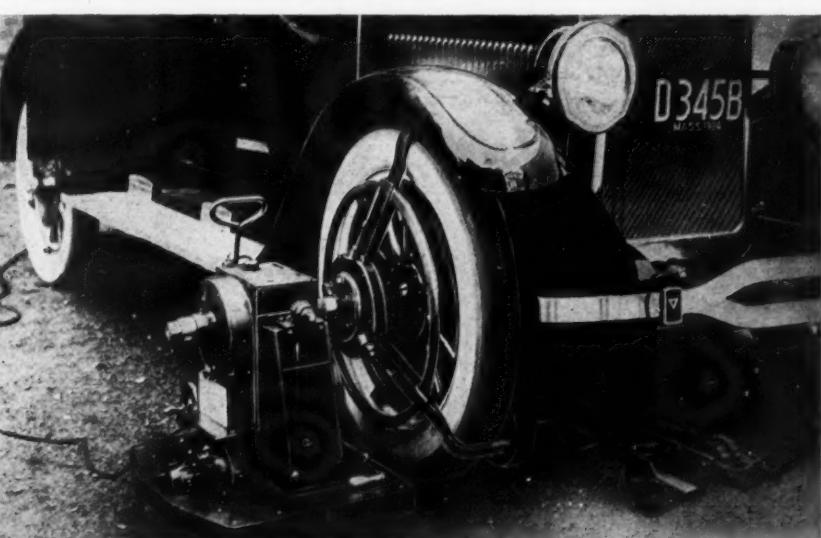
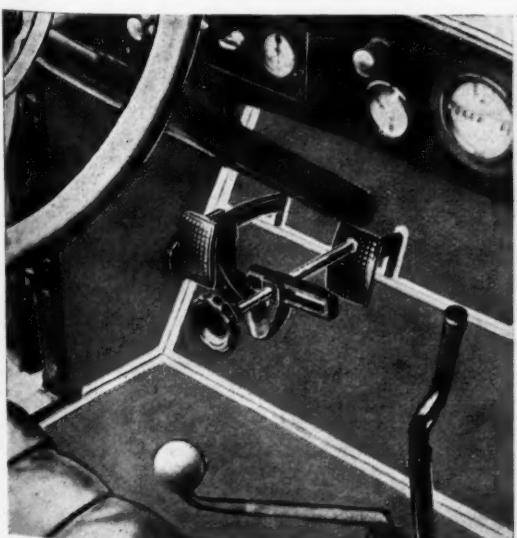
In applying the brake tester to a wheel, the car is first jacked up till the wheel is off the ground. Then a three-armed adjustable clamp (which fits any passenger car wheel) is fastened down upon the tire by means of a small crank handle. A mechanism similar to that of a lathe chuck is embodied in the hub of the clamp and serves to move the arms in and out. In the center of the hub there is a square hole, into which the squared shaft extension of the testing machine is adapted to engage.

The machine is mounted on a heavy cast iron base which is provided with casters for easy mobility, and by means of a small crank the engaging portion can be raised and lowered, so as to bring the shaft axis to the same level as the clamp axis. The drive is taken from one end of the shaft when testing a brake on the right, and from the other when testing a brake on the left side of the car, so the wheels will always be turned in the direction corresponding to forward motion of the car without re-

versing the direction of rotation of the electric motor.

A length of electric cable with a screw plug at one end and a push type of plug at the other is furnished with the machine, which can be plugged into a lamp socket. There is a switch on top of the machine, and after the latter has been connected up with the clamp on the wheel and the pedal has been depressed the current is switched on. A scale indicating the pull at a radius of 16 in. is incorporated in the machine, so that what practically amounts to the brake torque can be read off directly.

The chief object of the tester is to enable the mechanic to so adjust the brakes that those on opposite sides hold with equal power and also so that there is a suitable division of the braking power between the front and rear brakes in the case of four-wheel brakes. No attempt is made to measure the maximum holding power of the brakes. It is claimed that with the brakes on both sides of the car holding equally, greater braking power can be developed than would otherwise be possible without causing a skid. Service station men, in adjusting the brakes, naturally try to get those on opposite sides of the car to hold equally, but they have nothing to show that this result is actually attained, for the resistance opposed by the set brake to efforts to rotate the wheel by hand is deceptive, for the reason that the brakes generally have high spots and hold better at some parts than at others.



On left—Cowdrey patent pedal depressor. On right—Cowdrey brake tester applied to wheel

Accessibility with Complete Enclosure Combined in New Wisconsin Bus Engine

Pushrod tappets are mounted in die cast carriers which are integral with housing covers. Valves are seated in top of machined combustion space. Torque curve peaks at 650 r.p.m.

By W. L. Carver

ACCESSIBILITY, complete enclosure and a high degree of compactness are outstanding qualities of the new Wisconsin type-Z six-cylinder engine which has been designed for the modern type of bus service. At the right side of the aluminum crankcase are located the oil pump, distributor head and magneto mountings and the centrifugal water pump. Further back, provision is made for the mounting of an oversize starting motor on the forward side of an S. A. E. No. 2 bell housing which is made of cast iron and can be furnished optionally with an open flywheel arrangement.

Although room is allowed for the largest size of commercial starting motor, the steering gear can be placed alongside as a depression is cast in the crankcase wall which allows the electrical unit to be located unusually close to the centerline of the engine.

Generator Mounting

On the right side of the engine is located the generator which is carried by an S. A. E. flange mounting on the rear of the timing gear case and supported at the rear by an auxiliary bracket bolted to the crankcase wall. This unit is driven at 1½ times crankshaft speed by a composition gear which meshes with the cast iron camshaft gear.

Space is allowed for a generator of 6½ in. dia. and 12 in. length.

Somewhat to the rear of the centerline of the engine lugs are cast on the lower crankcase flange to accommodate a steel plate on the finished surface of the joint. On this steel plate, an air compressor can be mounted and can be driven from an additional composition gear which is located below the generator drive gear, the drive being transmitted through a rather long shaft and two flexible couplings.

Tappet Carriers Bolted Onto Cylinder Block

On this side of the engine the die cast tappet carriers are bolted onto the cylinder block. Three die castings form the valve housing covers and each carries a group of four roller type tappets. The tappets are restrained from falling through during assembly by wire snap rings which fit into grooves machined near the top of each individual tappet.

A combined intake and exhaust manifold also is located on the right or curb side of the engine, being designed for a 1¾ in. vertical carburetor. A hot spot is located

over the vertical leg of the intake manifold and branches carry the intake stream into the cylinder head at two

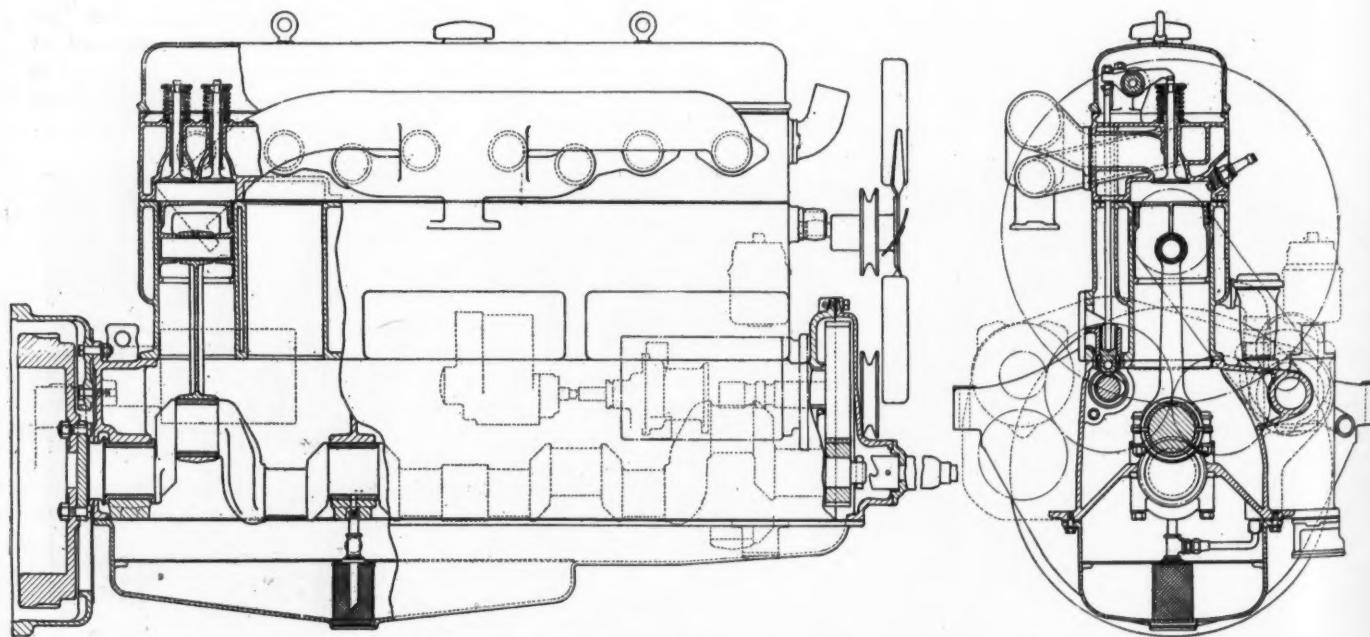


Fig. 1—Side elevation transverse section of new Wisconsin 4 1/2 x 5, six-cylinder engine

openings which connect with a passage cored lengthwise of the block and terminating at the end intake ports. The intake ports are siamesed while the exhaust ports are individual.

All valves are seated in the top of the machined combustion space and the clear opening for both intake and exhaust is $2\frac{1}{16}$ in. diameter. The valves are fitted with chrome silicon steel heads. Push rods which are cupped at the upper ends actuate the hardened steel rocker arms. A full length hollow rocker shaft is drilled to distribute oil under pressure to each rocker arm bearing. The spark plugs are set diagonally in the left side of the combustion chambers. A cast aluminum cover completes the upper structure of the engine.

The power curve, as shown in Fig. 2, indicates that this engine delivers just over 103 hp. at 2200 r.p.m. although the peak of the curve occurs at a slightly higher speed. Good low speed performance is guaranteed by the fact that the torque curve peaks at 305 lb. in. at 650 r.p.m. The bore of the cylinder is $4\frac{1}{2}$ in. and the stroke is 5 in. For six cylinders, this gives a displacement of 477 cu. in. All four main bearings are $2\frac{3}{4}$ in. diameter and 3 in. long. The crankpin diameter is the same but the length is $2\frac{1}{2}$ in. Bronze-back babbitt-lined bearings of the full surface type are used everywhere on the crankshaft while the camshaft is mounted in four bronze bushings which graduate from front to rear to allow the withdrawal of the shaft from the front end.

Lift of Cams Less Than That of Valves

Lift of the cams is somewhat less than that of the valves due to the leverage of the rocker arms. Intake valves open 5 deg. late and close 60 deg. late while exhaust valves open 45 deg. early and close 5 deg. late.

Connecting rod caps are retained by four bolts. The rod is $10\frac{1}{2}$ in. long between centers and carries a pressed-in bronze bushing at the upper end. Piston pins of $1\frac{3}{16}$ in. diameter are fixed against rotation in the piston bearings by means of Woodruff keys which are inserted at one end of the pins while snap rings in the piston bearings prevent endwise motion. This construction is illustrated in the longitudinal section of No. 6 cylinder, Fig. 1.

Pistons are light weight iron castings and are equipped with four rings of $\frac{3}{16}$ in. width, the lower being the Indiana oil scraper type which is mounted in a drilled groove. All cylinders are cast in one block with liberal provisions for water space clear around the barrels. The same provisions are made at the valve seats in the cylinder head. The water transfer holes through the cylinder head joint are arranged to insure equal temperatures from end to end of the engine.

No metallic gears are in mesh in the timing gear train as alternate metal and composition gears are used throughout. The steel crankshaft pinion drives a composition idler which in turn drives the metallic accessory and cam-shaft gears. The camshaft gear in turn meshes with composition generator and compressor drive gears, all of which are $1\frac{1}{2}$ in. face with helical teeth. Small helical gears drive the vertical oil pump and distributor head drive shaft from the accessory shaft.

Oil Pump Location

The oil pump is located on the lower face of the aluminum crankcase which is $2\frac{3}{4}$ in. below the center line of the crankshaft. Drilled connections through the joint and copper tubes convey the oil to a longitudinal header which is located just below the camshaft. Drilled passages supply the oil to the main and camshaft bearings and the crankshaft is drilled so that the lower rod bearings also are lubricated under pressure. The aluminum crankcase

pan is equipped with a false bottom and a cylindrical oil strainer which can be removed for cleaning. The pressure regulator and breather are located at the rear end of the crankcase while the oil filler is adjacent to the distributor mounting.

Total weight of the bare engine is approximately 950 lb. As shown in Fig. 1, two supports are at the conventional bell housing while the third is at the barrel concentric with the shaft of the starting crank, being turned on the cast iron gear case cover. Two eye-nuts hold the cylinder head cover casting down and may be used for

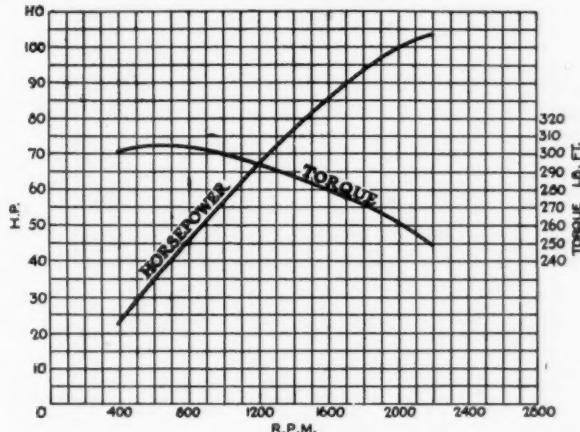


Fig. 2—Power curve indicating high low-speed torque and more than 103 hp. at 2200 r.p.m.

handling the engine during assembly or service work. A 20 in. diameter fan is carried on an adjustable arm at the front end of the cylinder block, the vertical adjustment being 1 in. The fan is driven from a pulley at the front end of the accessory shaft.

When required, the Westinghouse air compressor is driven at $5/7$ crankshaft speed. While no governor is built in, a K-P governor installed between the carburetor and intake manifold has been found very satisfactory and controls maximum engine speed within 2 per cent.

AN order for a rigid airship of 5,000,000 cu. ft. capacity, or more than twice as large as the ZR-3, has been placed by the British Government with Vickers, Ltd. The length of the hull will be 695 ft. and the maximum diameter 130 ft., the gas being contained in eleven separate bags. With the capacity mentioned, the airship will have a gross lift of 152 tons, while the disposable lift will be 75 tons. She will be propelled by seven 550-hp. engines of a new type, using kerosene as fuel, her contract speed being 70 m.p.h. At that speed the airship will have a range of 2500 miles, allowing for a fuel consumption 50 per cent in excess of still-air requirements. She has been ordered by the Government to be finished as a passenger ship, and will have accommodation for 120 passengers and 12 tons of freight. When completed, in September, 1927, she will be used for experimental flights from England to India, with one intermediate stop in Egypt. If successful, the vessel will, no doubt, be the forerunner of a high-speed regular airship service to India, with probable extensions later to Australia. Perth, it is interesting to note, would then be within eight days of London, assuming an average speed of 50 miles per hour. It may also be added that, if used for military purposes, the vessel could carry a load of 20 tons of bombs a distance of 4200 miles at 70 m.p.h., or 6500 miles at 50 m.p.h., and if used for scouting purposes without a load she could cover 9000 miles at the lower speed.

1925 Metal Market Outlook Does Not Justify Lower Car Prices

Steel makers seek better profits next year, while advances in pig iron seem likely. Price of aluminum will not go down. Cost of other metals tending upward.

By William Crawford Hirsch

WHAT conditions will the automotive consumer of iron, steel and non-ferrous metals face in 1925?

The radical transformation that has recently come over the iron, steel, copper, lead and zinc markets makes buyers even more eager than usual when on the threshold of a new year for a chart by which to steer their course.

Guidance in so fixed a form is, of course, impossible. In fact, statistics, the market's past history, never seemed less promising as a compass to the future than at the parting of the ways between 1924 and 1925. There are, however, some features and indications revealed by

Will this circumstance intensify the rising tendency of prices? This question can only be answered after considering whether steel is cheap or dear today. Are prices attuned to the general run of basic commodity values or are they higher or lower?

Steel is selling today at approximately 50 per cent higher prices than during the pre-war period. This is in full accord with the general commodity price levels and the dollar's diminished purchasing power since the war. Taking conditions as a whole, therefore, it may be said that steel is selling at normal prices today.

Sharp advances could endure only if the entire commodity price structure were to be revised upward. This does not preclude, however, short-lived price flurries brought about usually by a sudden deluge of demand which sooner or later gives way to a market utterly forsaken by buyers which prices recede below normal. The possibility of such ephemeral up and down movements being more frequent in 1925 than they are in 1924 must not be lost sight of. The generally anticipated industrial prosperity does not mean one continuous, even wave. Stationary prices are possible only

AFTER analyzing the metal market situation carefully, Mr. Hirsch gives it as his opinion that:

"On the basis of prevailing iron, steel and non-ferrous metal prices and the market outlook as it appears at this time, further reduction in motor car prices seems like swimming against the stream of rising costs."

in a dead market or an artificial one. Stability does not mean that prices will not respond within reasonable bounds to the changes in demand and supply from month to month.

At the beginning of the new year, automotive purchasing agents will do well also not to lose sight of the sentiment that animates steel producers. The latter feel that buyers have for many months been able to dictate prices, and they would not be human did they not hope for a prolonged period of a sellers' instead of a buyers' market.

Leading opinion in the steel industry inclines to the viewpoint that, if the demand at all warrants, slightly better prices would be more than justified. Production costs have not diminished, and some of the smaller mills have not been able to operate at a profit during the major part of 1924. At the same time, the leading producers are determined to prevent any snowballing of prices, no matter how insistent the 1925 demand might grow. Buyers' strikes are more costly than moderation in the first place.

Indications are that in 1925 the influence of steel buyers in industries that for many years were virtually out of the market will make itself more keenly felt. To some ex-

In the last analysis, the price of steel and other metal products is made not by how much is produced and bought, but by how much is consumed.

It is certain that steel has been bought of late at a rate considerably in excess of that at which it has been used up. In consequence, December steel mill output was greater than actual consumption by steel users who bought to protect themselves against generally expected advances.

Consumers in other than the automotive industries were more conspicuous as forward buyers than the latter, who, throughout the year, were consistent, dependable buyers, placing perhaps no spectacular orders at any one time, but spreading their needs over the entire year. Railroad and structural steel, although bought perhaps when the market is most opportune, is, as a rule, earmarked for definite projects, so that deliveries of the orders placed and specified against by the most important tonnage consumers of steel will not cause any congestion such as would have to be apprehended in the case of industrial consumers who bought in excess of their own requirements.

The paramount factor that will shape the steel market during the new year's first quarter, therefore, will be the rate at which general industry uses up the steel contracted for first quarter 1925 deliveries. So far, these consumers have not yet a sufficient quota of orders on their books to offset the steel tonnages they have contracted for.

Automotive manufacturers, however, will have to enter the market for much of their first and second quarter steel requirements while this question is still undecided.

tent, the automotive steel consumer will always have to pay his share if the ravenous appetite of users of heavy rolled products drives bar prices upward. When it comes, however, to automotive specialties, such as full-finished automobile sheets and distinctive automotive alloy steels, his attitude toward the market will always be the paramount influence on prices. This would seem to be especially true for full-finished automobile sheets since mill capacity for their production has been augmented to a point where even the peak demand of the industry can be satisfied with relative ease.

Danger in Automobile Sheet Prices

There appears to be danger however, in consumers seeking to hold the price of full-finished automobile sheets below levels in harmony with those for other steel products. The high prices of 1920 furnished the impetus for marked expansion in finishing equipment. There is danger of disintegration of this specialty industry, a valuable asset to the automotive manufacturer, if production is made unattractive by too great pressure on prices.

Buyers of full-fashioned automobile sheets are far more critical than they were five years ago, and prices in 1924 were far from attractive. In 1923, with the average price for sheet bars \$42.50, full-fashioned automobile sheets sold during the greater part of the year at 5.35 cents. The recent sheet bar price of \$37 did not afford sufficient of a saving to make up for the much lower prices obtained by the rollers of full-finished sheets, which up to a short time ago sold at 4.60 cents.

Not only is the tendency of the sheet bar market toward higher levels, but full-finished automobile sheets are very likely to come in for a general price readjustment.

Like readjustment, although probably on a more modest scale, must be figured with in the market for automotive alloy steels. The annual consumption of these, according to a survey recently made, totals approximately 750,000 tons. Of this tonnage approximately one-third is nickel steel. The tendency of the nickel market is upward. The same is true of vanadium, which enters into probably 170,000 tons of steel consumed by the automotive industries.

Automotive foundries which participated in the recent buying movement in the pig iron market are not likely to have cause for regretting this foresight. Leading blast furnace interests candidly admit that, if they had to do it over again, they would have asked stiffer prices from the very outset of the demand. When it had attained full headway, it was too risky to advance prices sharply, as this would have checked off the demand, then already sufficiently satisfied to enable buyers to hold off with further commitments.

Coke Increases Will Be Passed On

Higher prices for coke are looked for as the result of recently granted wage increases to coke oven operatives. There will be passed on to the pig iron producers. The latter had very little in the way of profitable market conditions since the spring and summer of 1923, and the market is due for a rise. In preparation for this, the idea has been sold to foundries that high pig iron prices mean high prices for finished castings. Potential competition of foreign iron, however, sets a definite limit beyond which no advance would seem to be possible, at least not for any length of time.

Aluminum market conditions are sphinxlike. One prediction, however, can be made. Unless unforeseen conditions of a revolutionary character set in, there will be no decline in prices.

As to whether there will be sharp advances, let conditions speak for themselves.

The sole domestic producer dominates the situation, im-

porters having virtually no metal to offer. Spokesmen for the domestic producer have repeatedly complained of the inadequacy of tariff protection under the prevailing law and intimated that the selling prices which prevailed in 1923 were hardly satisfactory. One can draw but one inference as to what the future trend of prices will be.

Demand in England for domestic consumption is exceptionally good. The same is true of Germany, where the output of the newly constructed Innwerke seems to be absorbed with ease by home manufacturers. France has not enough metal for her own needs. Swiss producers are booked to capacity. The copper market, with which aluminum has to compete in certain non-automotive uses, is on the upgrade.

For all that, however, what advances take place may be expected to be moderate. The danger of foreign competition of an energetic character when prices become sufficiently attractive is not lost sight of by the domestic producer, whose sales policy is always formulated not with a view to large profits over a brief period but an undisturbed, profitable outlet over the longest possible period of years.

Copper, after three years of vicissitude, seems to have definitely started toward more equitable price levels. To a large extent the pace at which this recovery will proceed will depend upon European buying. There will be downs just as well as there will be ups.

Zinc Price Levels Surprisingly High

Zinc has reached levels little expected last summer, excellent galvanizing demand and a considerable reduction in surplus stocks being the principal causes. As a result of the higher prices for these two brass-making metals, stiffer quotations for automotive brass products are now in vogue and further advances are by no means precluded. There is no danger of runaway market conditions, but copper can travel upward for quite a while yet before the price becomes topheavy. On the other hand, bear maneuvers in Europe may suddenly change the situation.

High prices for lead simply express the world shortage of this metal, which is so vital to the storage battery and bearing metal manufacturer. The best that the consumer can do is to buy on recessions or an average price contract. Long-continued high prices always stimulate production to some extent, either here, in Mexico or in Spain.

Tin has reached a price level that reminds one of war days. If American buyers turn their back on the market for a spell, there is certain to be a reaction. With the Far East surplus fairly well liquidated, however, sharp breaks are hardly to be looked for. What is likely to happen is that any attempt to lift prices still higher will meet with determined opposition on the part of buyers.

On the basis of prevailing iron, steel and non-ferrous metal prices and the market outlook as it appears at this time, further reduction of motor car prices seems like swimming against the stream of rising costs.

Table of Crankshaft Ball Bearing Sizes

In the following table are given the dimensions and size numbers of the ball bearings used on the crankshafts illustrated in our recent article on ball bearing crankshafts.

Name	Bore & Stroke	Four cylinder Engines	Front Bearing	Rear Bearing
			Bore Diam. No.	Bore Diam. No.
Dorman . . .	2.56 x 3.94	81	45	120 409 wide
Bristol Taxi	2.56 x 3.94	81	30	90 406 wide
Astral . . .	2.72 x 4.53	105	45	120 409 wide
White . . .	3 $\frac{3}{4}$ x 5 $\frac{1}{2}$	226	50	130 410 wide
A. E. C. . .	3.94 x 5.52	268	75	160 315
International	4 $\frac{1}{4}$ x 5	283.7	70	150 314
Autocar . . .	4 $\frac{1}{4}$ x 5 $\frac{1}{2}$	312.5	65	160 413
Commercar*	4.72 x 5.50	385	60	130 312
Saurer† . . .	4.33 x 7.09	417	55	140 411

*Intermediary bearing, No. 219 †Intermediary bearing, No. 220.

Tests Show Breakdown Pressure of Oil Films in Babbitt Bearings

Limiting bearing load in pounds per square inch of projected bearing surface increases with circumferential speed of journal and with viscosity of lubricant. Effect of adding oleic acid.

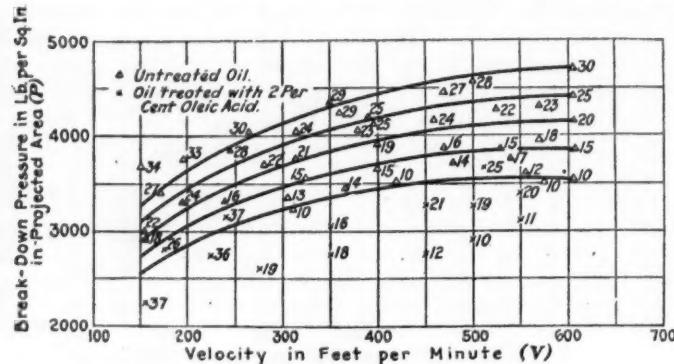


Fig. 1—Babbitt bearing, 2.764 sq. in. projected area, oil No. 5, $S = 308$. (Numerals refer to absolute viscosity in poises. Circles refer to untreated oil. Crosses refer to oil treated with 2 per cent oleic acid.)

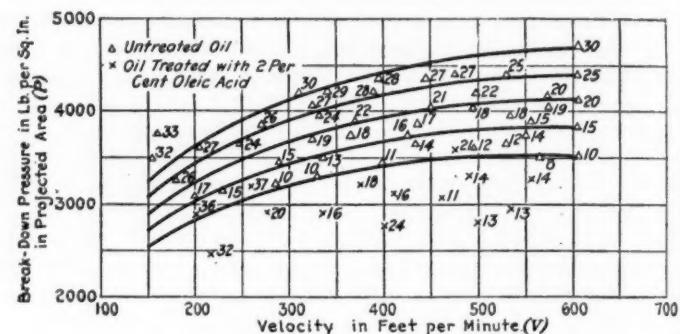


Fig. 2—Babbitt bearing, 2.764 sq. in. projected area, oil No. 1, $S = 205$. (Numerals refer to absolute viscosity in poises. Circles refer to untreated oil. Crosses refer to oil treated with 2 per cent oleic acid.)

MONG a series of three papers relating to lubrication problems which were presented at the December meeting of the American Society of Mechanical Engineers was one by Leonard N. Linsley which embodied the results of considerable experimental work carried out at Johns Hopkins University. A rather unique feature of the experiments consisted in the fact that the test bearing was made in halves which were pressed together by an hydraulic apparatus, so that there must have been two lines of closet approach between the journal and the bearing, while in the ordinary bearing there is only one such line.

The total load applied by the hydraulic jack to the bearing was indicated by a pressure gage which was graduated to read in pounds total load. The load was applied by rotating a worm by means of a hand wheel.

The bearing, with the jack, loading mechanism and supporting strap constituted a pendulum, the displacements of which, as indicated by a pointer on a scale, were a measure of the friction coefficient. The weight of the pendulum, the distance of its center of gravity from the axis of the bearing and the diameter of the bearing are other factors affecting the deflection of the pendulum by the friction. These three factors were constant in the experiments, and with their values for the experimental apparatus used the friction coefficient for any particular test could be found from the equation

$$f = 684 \sin \varphi / P$$

The temperature of the bearing was determined by a mercurial thermometer which was supported by a fiber bushing in a recess drilled in the bearing to within $\frac{1}{8}$ in. of the bearing surface. Thermo-couples made of copper and Advance wire were fitted into recesses right at the leading and trailing edges of the actual bearing area, so that the oil temperatures at both could be determined.

Vernier micrometers that could be read to one-ten thousandth of an inch were fitted to each half of the bearing supporting blocks, so that the vertical movements of the two halves of the bearing could be measured and in this way an approximate measure of the film thickness obtained.

In operation, the machine is started by closing the line switch and bringing the motor up to speed by the controller. The load is then applied by the hand wheel which actuates the hydraulic loading device. The application of the load is accomplished by pressing together the two halves of the test bearing which are free to move in the supporting strap but are constrained to move vertically in relation to each other by hand-fitted dowel pins which run through both halves of the bearing supporting block.

As the pressure increases the oil film thins out until small points of contact occur. Before this point is reached the pendulum remains perfectly steady and the pointer indicates a definite deflection which is a measure of the fluid friction; beyond this point, however, the pendulum grows increasingly unsteady until the critical point is reached, and the bearing grips the journal. When this occurs the pendulum is suddenly deflected through a large arc until its weight is sufficient to cause the driving belt, which is loosely fitted, to slip. The operator then opens the cut-out switch and shuts down the machine.

Two Grades of Oil Used

In getting the true break-down pressure any irregular mechanical application of force is avoided by bringing the pressure up to a value just below the critical point and then allowing the increase of temperature to cause the viscosity to decrease until rupture occurs.

Two grades of oil were used in the final tests, the

characteristics of these oils being given in the table below:

Table 1—Characteristics of Oils Used in Tests

	No. 1	No. 5
Gravity, deg. B.....	21.4	208
Specific gravity	0.9247	0.9284
Flash point, deg. Fahr..	330	355
Fire point, deg. Fahr...	385	410
Saybolt viscosity at 100 deg. Fahr.	205	308

Commercial oleic acid was used in the fatty acid treatment of these oils and contained 91 per cent of oleic acid, the rest being fixed oils, principally lard oil.

The first tests were made on cast-iron bearings, but it was found that at high speeds the seizing caused injury to the journal, and for that reason the rest of the tests were made with babbitt bearings.

A cast-iron sleeve was made, turned 1/16 in. large, recessed and undercut to hold the babbitt metal liner, having a finished length of 2 in. The babbitt was poured in the usual manner, peaned, and then turned a little oversize. It was then fitted by hand, lapped in, and finally was touched up with powdered Sapolio on the test journal. This method produced a very fine bearing surface which would become highly polished when in use a short time, but it was found to be impossible to make this polished contact surface occupy the entire bearing surface available. The actual bearing area would grow larger with each refit and with wear, but even when the experimental work was stopped, only about 80 per cent of the bearing surface had come into play. It is to this fact that the progressively higher pressures with each refit is attributed. Entirely concordant results could only be expected after an unchanging, highly polished bearing surface had been produced. It is thought that to produce such a surface, covering the entire available area, it would take weeks, perhaps months, of "running in" the bearing under considerable pressure.

The preliminary trials with the babbitt bearing indicated that the breakdown pressure would be materially higher than with the cast-iron bearing. After some changes had been made in the rigging for applying the load in order to enable it to withstand these higher pressures, a systematic series of runs were begun. It also developed as the tests progressed that in each successive run the breakdown pressure grew higher, confirming the conclusion that had already been reached that the fit of the bearing was the controlling factor influencing the results. In any period, however, fairly consistent results were obtained, and one could predict quite closely at what pressure the rupture of the film would occur.

Results Became More Consistent

Unfortunately, when the bearing was reassembled after examination and a new trial started, the former relationship would be considerably disturbed.

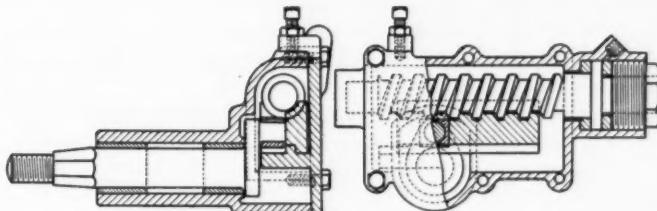
No very close agreement with the former values could be attained, but as the work progressed it became more evident that as the fit improved the results would become more consistent.

After the trials had progressed to such an extent that the results grew consistent to a fair degree, it was decided to proceed with the final trials. The procedure followed was to run a series of trials with the straight mineral oils until enough data had been determined to establish the curve, then shift over to the treated oils and repeat the process. The results of these trials are shown graphically in Figs. 1 and 2.

The curves drawn in Figs. 1 and 2 are of the same form and are not intended to be curves that represent the characteristic behavior of the breakdown pressures. They are drawn merely to aid the eye in following the trend of the data. It would be too much to say that the curves represent what really happens, because it is recognized that the machine was mechanically deficient, the degree of fit not perfect, and the temperature observed was probably not that which really obtained in the oil film itself. It is believed, however, that the data recorded does sensibly represent the magnitude of the breakdown pressures with that particular degree of fit.

Contrary to expectation the breakdown pressures obtained after the oils had been treated with the 2 per cent oleic acid were materially less than with the untreated oils. The breakdown point was not so sharply defined as with the straight mineral oils. The unstable period which indicated contact was much longer and in consequence the actual critical points were very erratic. This apparent discordance was no doubt due in a large measure to the fact that the real temperature of the film was unknown, as in this case the contact friction caused the temperature to rise very rapidly and no doubt it was not properly registered by the method used.

New Steering Gear Has Positive Outside Adjustment



Latest type of steering gear added to Wohlrb line

A STEERING gear of the screw and half nut type has been added to the line of the Wohlrb Gear Co. of Racine, Wis. A feature of the gear is the positive outside adjustment for wear which is made by turning set screws which project through the housing. These screws move the guide which positions the half nut in reference to the main screw. This guide is attached to the cover plate of the main housing; consequently the holes through which pass the cap screws which hold the cover in place are elongated, thus permitting the necessary travel. The adjusting device is used both for the original setting of the half nut and for taking up wear.

As shown in the accompanying cut, the screw is mounted in an oil-tight housing. The screw has $\frac{5}{8}$ -in. pitch and is cut with a 50 deg. included angle. Bottom and top clearance of 0.035 in. permits of the necessary adjustment for wear. One side of the half nut is slotted to engage with the hardened steel sliding block which swivels on the pin at the cranked end of the steering arm shaft. The back face of the half nut is slotted to fit the guide on the cover plate. Plain thrust bearings are shown in the accompanying drawing, but ball thrusts can be employed if desired. The usual thrust adjustment is provided.

This new gear is manufactured in two models for original equipment, the offset model, designed to replace worm and gear types, and straight model, intended for use in place of the split nut style of gear. A model intended for Ford replacement also is made and is expected to be the bulk of production in this style of gear.

Tells How Pressure Lubricating Systems Can Be Improved

Engineer of Texas Co. advocates pumping fixed quantity of oil per revolution of crankshaft. Moderate dilution not harmful if abrasives are filtered out.

By Neil MacCoull*

AMONG the difficulties resulting from the use of fuels of low volatility are those incident to starting and lubricant contamination. On the vital matter of lubrication hangs a huge sum of dollars and cents spent for wear. Cars wear out too fast.

I look forward to the day when any *good* car can be expected to cover at least 100,000 miles with no mechanical attention to the engine. Engines are now in commercial use which come close to this figure, except for grinding valves and removing carbon, which has to be done about five times during such a period.

Engine designers have done much and can do much more to reduce wear in the choice of materials and by securing rigid designs, but our interest lies in carrying out the requirements for long life from the angle of lubrication.

An important feature of engines with conventional pressure lubricating systems is that, since the crankshaft rotates in a clockwise direction, the oil is thrown on the right side of the cylinder, and the right side only. Furthermore, as the piston moves down in its power stroke the side pressure is on the left side, where no oil has been thrown directly. How, then, does oil get to the pressure side? Apparently it first works around, partly by capillarity, if the piston skirt is not made with a split or saw cut of some sort; then, after the oil in the whole system has become well warmed up, it forms a heavy mist in the crankcase from which it wets any surface exposed to it.

The truth is that when an engine is started cold the cylinder gets no oil at all for several minutes. In one engine I have seen, even after a run at 1500 r.p.m. for over a minute with 15-lb. oil pressure, not a drop of oil reached the pressure side of the cylinder. Fortunately, cast iron surfaces will stand quite a little treatment of this sort, but not so with aluminum.

Oil Pressure Variations Desirable

A second feature of this typical system which greatly increases the time a cold engine may run before the required part of the cylinder is the fact that the oil pressure to the bearings is held more or less constant by means of a spring loaded regulating valve.

When the oil is cold a very high pressure is necessary to force the normal volume of oil through the bearings. But before the pump can build up such a pressure the by-pass valve opens and releases most of the oil back into the crankcase. Consequently, while the oil is cold very little passes through the bearings, and naturally very much less reaches the cylinder than normally. To aggravate matters still more, consider these two additional facts:

First, in cold weather most engines have to be flooded

with a lot of wet gasoline to get enough evaporated to start combustion. The unvaporized part washes most of the oil off the cylinders.

Second, the burned gases next deposit a film of water from the products of combustion on the now clean cylinder walls if their temperature is lower than about 60 deg. Fahr.

Can worse conditions be imagined for replenishing the oil film on the side of the cylinder where it is most needed? What lubrication does the valve stem get? I cannot see how they get any oil until it has been heated up enough to form a fog in the crankcase, which seems to be the salvation of our engines.

Other Faults of Pressure Systems

Some further faults of the conventional lubricating system, which remain even after the engine is warmed up are due to the fact that the quantity of oil passing a set of piston rings and reaching the combustion chamber is controlled by the quantity passing the bearings. But this varies with the oil temperature, bearing clearance and oil viscosity. The volume of oil thrown onto the cylinders each revolution is thus very important because it controls the rate of oil consumption.

No more oil should reach the combustion space than is necessary to safely replace what is burned. Thus, if a new engine with tight bearings gets enough oil to the cylinder, when its bearings have been worn and the oil may be diluted with fuel, five or even ten times as much oil may be thrown as before. In other words, five or ten times as much oil might be consumed as was originally deemed safe.

This is all because of the attempt to hold the oil pressure constant under all conditions instead of keeping constant the oil volumes delivered per revolution. The curves in Fig. 1 are taken from some of our laboratory work in which we controlled and measured the volume of oil actually passing a set of bearings. The volume is indicated by the oil pump speed.

This set of curves shows how a variation of oil pressure varies the volume of oil passed through the bearings and the resulting oil consumption. The highest oil consumption used in these tests was not enough to cause smoke in the exhaust, yet it was over seven times as much as the lowest, which still showed good lubrication.

Variables, such as bearing and piston ring clearances, are so obviously beyond exact control that it is not surprising that no two engines even of the same make burn the same quantity of oil. I can find no reason why one should have to have more in the cylinders than another. Yet engines are designed and built, and then an oil engineer of his equivalent is incited in to recommend the "exact" grade of oil which will make that one engine run

*Condensed from a paper presented at the Fifth Annual Meeting of the American Petroleum Institute.

its best, and if he makes a thorough test he will get a series of curves somewhat like those in Fig. 2.

Now, with such data I ask how one can determine the best viscosity oil to use? If the answer be based on horsepower, the thinner the oil the better; if it be based on low oil consumption or sweet, quiet running, the thicker the better.

Better Oil Economy Possible

An engine with a pressure lubricating system actually should burn from 30 to 50 gallons of gasoline to one gallon of oil. This holds for any road vehicle. Better oil economy is possible up to 100 to 1, but in average engines this is too near the danger line for, in a pressure lubricating system, one of the cylinders is sure to get much less oil than the others, since all bearing clearances cannot be made nor kept the same.

In fleets of vehicles in a given service the gasoline consumption often is almost the same for each vehicle, but the oil consumption frequently varies in as great a ratio as 5 to 1.

Of course, a different oil cannot be used for each engine, hence, to equalize such great differences as these the only practical expedient is to vary the oil volume delivered per revolution; in other words, the rate of circulation. This, unfortunately, only can be approximated for engines now built by altering the spring tension on the bypass valve. Certainly, if one bus can make 1200 m.p.g., there is no sense in running another of the same make on the same route, giving but 150 m.p.g. It is not the actual cost of wasted oil with which I am so much concerned as with the accumulation of carbon or fouled spark plugs which usually follow.

Why should not an engine be designed around an oil which should be used rather than to try to find an oil to suit an engine after it is built? In other words, isn't it feasible to adapt an engine to any desired oil by proper regulation of the rate of oil circulation to secure a normal oil consumption? By this means it should be possible at least to eliminate the necessity for using oils of such high viscosity that they are too sluggish to flow in a cold engine, and that usually leave large carbon deposits.

I recommend elimination of oil pressure regulating valves, except as a safety valve. The fundamental principles back of the spring loaded valve are all wrong. It

starves the engine when starting on a cold day and floods it after a long run in hot weather. It may make an old engine with loose bearings smoke if kept at the same adjustment made by the factory when it was new and it tends to flood the cylinders with oil at low speeds and starve them at high speeds.

In Fig. 3, curve A representing a normal variation of oil pressure with engine speed, while our curve B shows the pressure that should exist if the same volume of oil is thrown on the cylinders at each revolution for all speeds. I cannot see why a more or less constant pressure should be sought after instead of a constant volume per revolution. Let the oil pump act like a meter, make it the right size, and let the pressure required to deliver that volume go where it will. If adjustment of the rate of circulation is needed for varying piston ring fits, this can be done nicely by the use of an open orifice in place of the spring loaded valve.

Under all conditions of oil viscosity and engine speed, this will bypass a much more nearly uniform percentage of the pump discharge than the spring valve. Adjust the volume deducted from the bearings by the size of this orifice. But it is my experience that ordinarily no bypass at all is needed. The present method of altering the spring tension has very little effect at low engine speeds, and it cannot be expected to reduce smoking while the engine is idling.

Some Splash Systems Excellent

Some splash lubricating systems have been developed which are excellent for any vertical cylinder engine. The volume of oil splashed on each cylinder at each revolution depends on the volume supplied to the trough each revolution. These systems eliminate the important variable of bearing clearances so that each cylinder can be assured of an equal volume of oil, which is impossible with orthodox circulating pressure system, and there is the added advantage of flooding the cylinders with a large slug of oil when starting. Troubles experienced recently with aluminum pistons in automobiles have been confined almost entirely to pressure systems.

We know of three other ways of overcoming the fault of present cylinder lubrication which prevents definite control of the oil consumption. One is the system used in the engine of the great airship Los Angeles. In these engines,

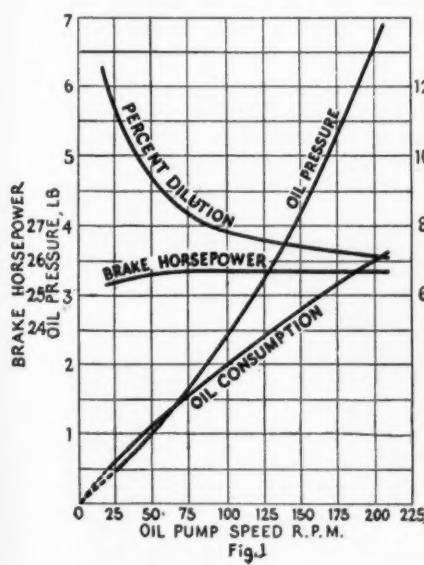


Fig. 1

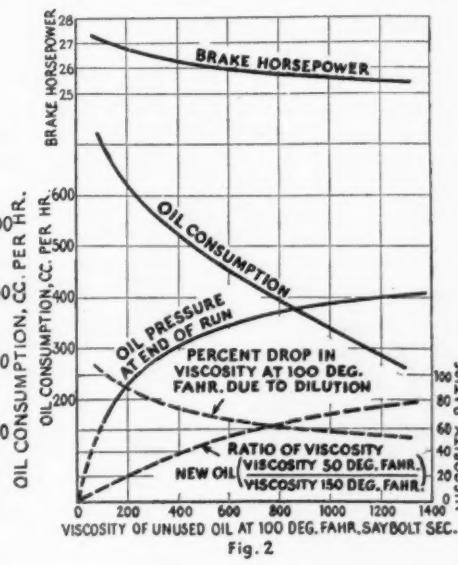


Fig. 2

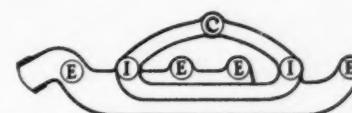


Fig. 4

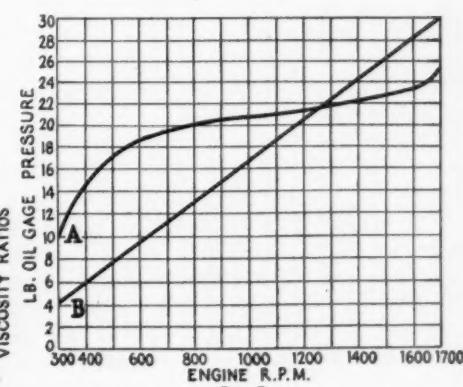


Fig. 3

Fig. 1—Curves showing how volume of oil pumped through bearings and resultant consumption varies with change in pressure. Fig. 2—Effect of viscosity on oil consumption and b.h.p. Fig. 3—Curve A, normal variation of oil pressure with engine speed; Curve B, pressure that should exist for same volume delivered per revolution. Fig. 4—Diagram of manifold which tends to separate liquid fuel from charge and vaporize it by use of exhaust heat

all crankshaft connecting rod and main bearings are of the roller type. I understand that small jets of oil are sprayed directly on the piston skirts when they override the cylinders at the bottom of their strokes.

A second system is that used by Ricardo in engines he designed for the British tanks during the war. It is possible to flood the cross head with oil, without fear of excess oil getting into the combustion chamber.

The third system is to use the well known multiple feed oiler, which measures out and forces a definite volume of oil directly to the cylinder walls, as is done on practically all Diesel engines.

Experimental work done in our own laboratory and corroborated by other experiments, has shown that the viscosity of oil in an engine drops rapidly at first, and soon reaches an equilibrium after which it stays more or less constant. The extent to which this dilution progresses depends on the temperatures of the crankcase and water jacket, the ratio of fuel to air delivered by the carburetor, the rate of oil consumption, and the nature of the oil used.

How Dilution Can Be Minimized

Dilution can be limited to a matter of but small importance, provided the crankcase temperature is high enough. It takes some time to heat up a cold crankcase or cylinder jacket on a winter's day. Means taken to shorten the normal warming up period are a help. Various thermostatic controls of the jacket water circulation and radiator shutters should not be overlooked, nor a very interesting system of steam cooling developed by S. W. Rushmore.

Starting can be aided by the design of the intake manifold. Fig. 4 is a diagram of a novel manifold design which has several excellent features. The lower part is the exhaust manifold. The carburetor is attached at C. When the engine is started, the unvaporized fuel follows down the side walls and collects at the bottom, vaporized fuel only entering the cylinder ports I. The manifold acts like a separator.

When the engine starts, the heat of the first few explosions begins to boil off the liquid resting at the bottom, and in so doing, enriches the mixture passing to the cylinders until the fuel in the bottom is all vaporized. This enriching of the mixture can be made of the right duration to cover the whole warming up period by varying the area of the lower passage of the intake, thereby altering the volume of air rushing back and forth as a result of the pressure pulsations which always exist between the ports of an intake manifold.

Moderate Dilution Not Serious

With this array of methods for reducing the quantity of fuel getting into the lubricating oil while starting, or while running, or by removing it after it gets there, it would seem that crankcase oil dilution itself should not be a matter to worry us in future designs. The principal objection brought out in the cooperative fuel research at the Bureau of Standards, against fuels of lower volatility than present day gasoline, is the pronounced increase of crankcase dilution. Moderate dilution will do no harm if solid abrasive materials are not present in the oil, and indeed it may be of real benefit during the period of warming up a cold engine.

Frequent drainage of all the oil helps to remove abrasive sediment, but constant filtering is the right way to get it out. Both air filters and oil filters can be much improved and neither filter entirely replaces the need for the other.

There are two more methods of prolonging bearing wear, independent of oil filters. The first is the so-called all loss system in which oil is used only once. It sounds extravagant, but I have seen data showing as low a volume of oil used in this way as that normally burned in circulating systems. The second is the substitution of ball or roller bearings for plain bearings. These two methods are being worked on quite a little at present, and we may hear more about either any day.

Simple Device for Shipping Cars Without Boxing Patented

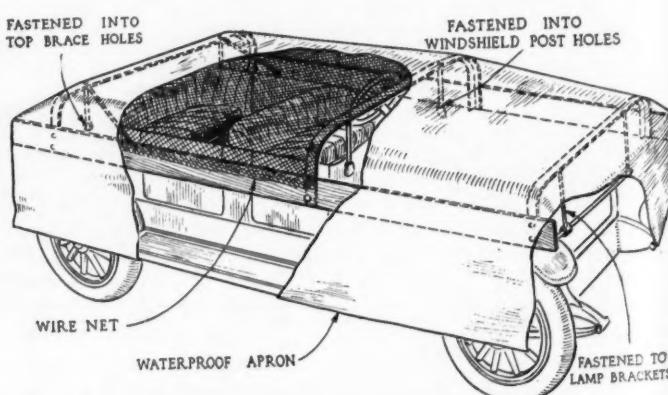
A NEW arrangement for shipping open cars abroad without boxing has been patented recently by Birger Jacobson. It is said to reduce shipping costs from \$70 to \$100 per car. The windshield is removed and strapped between front and rear seat cushions; headlamps and radiator cap are wrapped and placed in the rear tonneau; the top is folded, burlapped and placed at the rear of the car over the spare rim. Three or four iron bows are used, depending on the size of the car. These are fastened to the lamp supports, windshield holes and top rest holes.

These bows extend crosswise over the sides of the car to the outside of the fenders two or three inches above the height of the hood. Boards the length of the car are affixed to these bows, wire netting is stretched over the top, and doors are wired from the inside to prevent removal of articles from the tonneau. A supporting bow is necessary for a long car and is screwed to the lengthwise boards just back of the driver's seat.

Over this framework weatherproof material is attached which is caught underneath the running boards and over both ends of the car.

Covered in this manner the cars can be shipped on flat cars from factory to port without boxing. Insurance companies are said to hold this system pilferage and

weatherproof, and steamship companies accept cars on wheels and so covered for "tween deck" shipment at the usual rate. Cars are hoisted on deck on platforms and fastened to pillars or other fixtures of attachment. By this method savings are made on dis-assembly and boxing, in this country and uncrating, assembling and hauling on arrival abroad.



Cover designed to replace boxing for cars to be shipped abroad

Just Among Ourselves

Practical Use for Cross-Word Puzzles

USE of cross-word puzzles to solve the grade-crossing accident problem was suggested by one facetious delegate at the National Conference on Street and Highway Safety. He urged placing a large cross-word puzzle 100 feet in front of every grade crossing; everybody would stop to solve it, and there wouldn't be any need to argue about the advisability of a "full-stop" law. We suppose that 1-horizontal would be a four-letter word meaning "don't go forward and don't back up."

Will Battery Sizes Increase?

THE size of batteries used as original equipment has been the subject of more than one unfavorable comment. First cost, of course, must be a primary consideration in the selection of many of the units so used, but the trend toward better quality seems to be getting under way. It will be interesting to examine the new models at the show from this standpoint. It is almost certain that more powerful batteries will be found on some of the important new models which will be on display.

Are Profits in Many Lines or One?

WE mentioned a while ago that many of the mergers proposed today seem to be based chiefly on the idea that merchandising advantages are to be gained through providing the dealer organization with a complete line of cars. At least, this has been one of the important reasons given in the case of several merger proposals. Sometimes an idea is believed just through constant repetition. Finally it becomes wrapt in a cloak of tradition so that it passes current for truth regardless of

its merits and to question it means scorn for the questioner. So it is well to question ideas soon after their birth. If they survive the process of inquiry, well and good. If not they are better dead. As regards this particular idea, it may be remembered that thus far no car manufacturer, even those making one car in every price class, have been able successfully to get their entire line handled by a single set of dealers.

Competition for Export Sales Hastens Education

DEVELOPMENT of foreign automobile sales is chiefly a matter of education, says the chief executive of one big passenger car company. The quickest way to spread automotive education abroad, he continues, is to increase competition for foreign sales among American manufacturers. Consequently, he is in favor of as much competition in the export field as he can get, believing that his own sales will be benefited in the end. Broad-gage views of business development, such as this, have been responsible for the building of more than one great industry.

Pyroxylin Finishes and Fabric Bodies

THE fabric body does not seem to have taken hold in this country as strongly as in Europe, although certain custom body builders are making progress with it. In the opinion of one man, thoroughly familiar with problems of the production body builders, the development of pyroxylin finishes has been an important factor in holding back fabric body development. The fabric body, he says, might have gone over more strongly, had not pyroxylin finishes come on the market, because the public was very much dissatisfied with the durability of many paint jobs.

Closed Cars To the Fore

CLOSED cars have been coming with a rush for several years, but the development in 1924 was greater in many ways than ever before. The price of a closed job dropped below that of an open car of the same line for the first time. The proportion of closed cars produced went up materially. And we wouldn't be a bit surprised to learn within the next seven days of a new line of cars comprised entirely of coach and sedan models.

Gaging "Arrival" of New Features

IT is often thought that a particular automobile part or type of construction has "arrived" when it is mentioned in the headlines as an outstanding feature of a car description or when people all talk about it when it makes its appearance. As a matter of fact, it actually has arrived only when people have stopped talking about it and have come to accept it without question or comment as an integral part of their everyday thought. The automobile itself hadn't arrived until it was no longer a novelty and until it no longer attracted any particular attention as it came down the street. Up until that time it was an experiment. These thoughts were recalled to our mind by the description which we read the other day of the first Buick car, which was featured in the *Automobile Trade Journal* of September, 1904, as "The Buick Motor Company's Side-Entrance Tonneau." The side-entrance tonneau is no longer a distinctive feature—it has arrived. It's difficult sometimes not to be fooled into mistaking curiosity and temporary interest for arrival.

N. G. S.

Extension of Time Sales Abroad Increasing Exports of Cars and Trucks

Partial payment systems operating in Great Britain, France, the Scandinavian countries, Australia and other countries, in Africa, Asia and South America. Plans in general use are few.

By D. G. o'Connor

THE number of plans under which cars and trucks are sold on deferred payments throughout the world are comparatively few. In the United States time sales are estimated at from 50 to 80 per cent of the total.

That volume sales depend on time payments is borne out by the figures for the United States and by increased sales in the many countries in which deferred payment plans are operating. Great Britain, France, the Scandinavian countries and Australia all have plans for financing retail sales. Credit is extended in much the same manner that it is under the two plans, *with recourse and without recourse*, in general use in this country.

In England retail financing is referred to as "hire-purchase" plan. Ownership may remain with the dealer until all payments have been made; the financing company may assume entire responsibility; or a sale may be made subject to a chattel mortgage which is not legal in all countries.

It is estimated that from 25 to 75 per cent of the sales made in Great Britain are under this hire-purchase plan, and one-fourth is usually the first down payment. Since the strictest secrecy is observed by both financing houses and dealers it is difficult to get an accurate estimate of the proportion of sales made under this plan.

A central body of financing companies has been formed there, and the corporation or individual who finances the sale is termed the owner until the last payment has been made. The buyer is termed the "hirer," and from twelve to eighteen months credit is extended.

While 25 per cent is the down payment customarily demanded some houses will accept as little as 12½ per cent. With the first down payment the purchaser pays his insurance premium and the license fee of £1 per h.p. Interest charges on the unpaid balance amount to from 7 to 8½ per cent.

In some cases the interest charges are included with the first payment. If included with the monthly payments ½ per cent is added as an extra interest charge. Payment is made by promissory notes or bills drawn on the "hirer's" bank. The finance companies in England expect the hirer to come to them and explain any difficulty in case of non-payment. The Ford £ a week savings plan is not operative in England.

In Sweden one of the largest distributors finances 90 per cent of his sales under his own plan on a basis of one-third down plus interest of about 8 per cent on the unpaid balance for the period of ten months. There is no chattel mortgage given, but the contract reads should any of the sight drafts not be honored promptly the dealer has

the right to sell the car. Insurance policies are in favor of the dealer.

The banks discount the sight drafts at about 6 per cent and agreements with local banks are made on the strength of the dealer. There are no automobile financing companies in Sweden. There are about 45,000 cars registered, however, and with the country in a very prosperous condition, exchange above par and a population of 6,000,000 potential sales should be more than twice the number of present car registrations.

Norway, Denmark and Finland are less favorably situated. They are suffering from adverse exchange and few banks are willing to carry the dealers. When financing is resorted to the sum of the commission enters the contract and monthly interest drawing drafts are used under a renting agreement in which interest, commission and insurance are included. A few dealers in Norway lost money on the time sales plan at one time because the roads were so bad that purchasers turned their cars back after only six months totally worn out.

Denmark is suffering from a 25-35 per cent extra import tax based on the list price which it is hoped will soon be removed. The first of the deferred payments usually is for the sum of the extra tax on list price, plus ¼ the list price of the car, plus insurance which is compulsory. Local banks carry the dealer.

France has three time payment methods in operation. With the manufacturer financing retail sales, which he does with the financial guarantee of an insurance company, the buyer pays 1,000 francs when he places the order, a variable amount when the car is delivered and the balance in twelve monthly installments for which he pays about 6 per cent.

Insurance Company Provides Guarantee

With the dealer financing a sale he obtains a guarantee of 80 per cent of the credit from an insurance company. The insurance company investigates, and a minimum payment of 1-6 is paid on delivery, the balance being paid in 12 to 18 installments.

With a credit organization the cars are purchased from the manufacturer and in turn sold to the user. These credit companies are not strictly automobile financing companies, for they are prepared to back the purchase of any kind of goods. Again 1-6 is paid down and the balance is paid in installments for twelve months at 9 per cent interest. Though the dealer is expected to furnish service he is entirely left out of all purchasing arrangements.

The annual premium on insurance amounts to from

"As the number of car owners in any country increases to a point where non-car owners are people in limited financial circumstances a weekly savings plan becomes increasingly valuable."

\$30 to \$80 and as the credit organizations usually are interested in some insurance company they acquire added revenue from this source. Insurance is not compulsory in France, though under the sale agreement every purchaser must take out insurance covering accident to third parties, property damage, theft, fire and third party risks caused by fire.

One hundred and thirty-one thousand one hundred and fifty-six cars and trucks were delivered in the United States on the Ford weekly payment plan during the first eighteen months it was in operation. They represented sales which probably would not have been made by usual sales methods and time payments.

As registrations of the number of car owners in any country increase to a point where the non-car owners are people of limited financial means such a plan becomes increasingly valuable. Such a plan needs the support and co-operation of banks, for dealers in this country at least are prohibited from receiving deposits by banking laws in so many states.

In many instances under the \$5 a week plan the purchaser allows the complete purchase price to accumulate before delivery. The depositor receives the regular rate of interest obtaining on savings accounts, usually three to four per cent, and he may withdraw a part or all in exactly the same way that he could withdraw money from a savings account.

Under most schemes the bank carries the accounts in the name of the individual, but under a plan more recently instituted in Detroit and its environs all accounts are carried in the name of one corporation.

This corporation sells a coupon deposit book to the prospective purchaser. When he makes a deposit the bank gives him a receipt for the amount and credits the corporation, who have the responsibility of keeping records

PROPOSAL FORM FOR HIRE PURCHASE.

Applicant's Statement:

For the purpose of inducing you to enter into a Hire Purchase Agreement with me/us the proposed Hirer(s) in respect of New Motor Vehicle described in the Schedule below, I/we make the following representations:

Hirer(s) Name(s) in full, or style of Firm _____

Business Address _____

Occupation, Profession or Trade _____

How long established _____

Private Address _____

Has any Company or Firm at any time declined to enter into or cancelled a Hire Purchase Agreement with you?

Name and Address of Bankers _____

Name and Address of Employer (if any) _____

Status if Householder If over 21 years of age _____

I/we own the following property:

Situation _____

Value £ _____

Mortgage or encumbrance £ _____

Give two references:

Name _____

Address _____

Occupation _____

Name _____

Address _____

Occupation _____

Retail Price of Motor Vehicle (including all equipment and extras) £ : : :

Interest Charges at	per cent.	£	:	:
on £		£	:	:
		£	:	:

Deposit	£	:	:
	£	:	:
	£	:	:

Balance	£	:	:
	£	:	:
	£	:	:

The Balance by monthly hire payments of £ _____ on the day of each month commencing _____

I/we hereby certify that the above statements are true in every detail, and that I/we have no knowledge of any fact which might affect your decision in regard to entering into a Hire Purchase transaction with me/us.

Applicant's Signature _____

If Married Woman, Husband's Signature _____

Husband's Occupation, Private and Business Address:

Date _____

*Information required from prospective purchasers in England.
Forms used by various finance companies differ very little*

from the coupons forwarded to them and of following up delinquents. In this way the bank handles only one account.

Obviously this plan depends upon the cooperation of the bankers, for deposits may be made in any of a large number of banks in various sections of the city.

Modifications of the Ford in England

BRITISH buyers, although attracted toward the Ford by its low price, have found certain of its features not to their liking, and their objections to these features became so pronounced that the Ford organization in England saw fit to make certain changes in design. The Ford is made in England in the same body styles as here, but they there bear rather different names. The sedan, for instance, is known as a saloon, and both a Tudor saloon and a Fordor saloon are being offered, the identity of which will no doubt be plain from the names.

The most radical change in appearance has been brought about by lowering the car. This has been accomplished by using a special design of steering knuckle in which the knuckle spindle joins the vertical portion near the top end, instead of at the middle, and by letting the center portion of the rear spring more deeply into the frame.

The running boards have been improved, while on the Fordor saloon an interior adjustable rear view mirror, windshield cleaner, dashlight and rooflight are now standard equipment. The radiator has been raised and its shell and the lamps are now nickelplated, which sets off the front end of the car to better advantage. The bonnet line now merges smoothly into that of the cowl, which latter is fitted with a ventilator. All of the six windows of the saloon now have adjustable glass panels.

On the open models side curtains are now provided and the top is continued around the rear quarter to give additional protection. This latter feature, of course, has been supplied in this country for some time. The English cars are finished in gray and a new type of upholstery harmonizing with this finish is now used, while the cushions are deeper and more inclined. The lighter pistons, recently announced here, are also fitted in England.

Here and There in Foreign Markets

By special arrangement with the Automotive Division, Bureau of Foreign and Domestic Commerce

Italian Market Improving

ITALIAN automotive imports and exports, for the current year up to Aug. 31, or for two-thirds of 1924, show a much heavier volume of trade than for corresponding periods of 1923 and 1922. In the eight months of this year, imported automobiles—including in the Italian classification cars, trucks, tractors, etc.—numbered 956, compared with 627 in the same eight months of 1923, and with 150 in the corresponding period of 1922.

Of the 954 vehicles imported in the January-August period of the current year, more than half, or 548, came from the United States, which were undoubtedly largely cars and some tractors of one low-priced make. Those 548 vehicles from the United States were valued altogether at lire 5,071,282, or, singly, at lire 9,254 on the average.

From France 282 cars, trucks, etc., were imported in the first eight months of 1924, consisting largely of cyclecars, which have become increasingly popular in Italy during the past year. These 282 French vehicles had a total value of lire 2,703,029, or an average value of lire 9,585.

A higher average value, lire 26,718, was possessed by the 15 cars, trucks, etc., coming from Austria in the first eight months of this year. From Germany came 45 automobiles, valued at lire 724,233, or an average of lire 16,094, probably consisting largely of cyclecars and possibly a few Mercedes cars.

Bus Transportation Needed in Bombay

THE population of Bombay has increased so rapidly during recent years that the question of providing adequate means of transportation is an important one. An omnibus service would be established immediately, were it not for the fact that it would violate certain rights of the street car company.

The original charter granted the street car company stipulated that the city would grant no charter or license to operate street cars or bus lines on any streets where the street car company was operating. However, the Municipal Corporation is largely made up of Swarajists (independent party and anti-English) and as the railway company is controlled by English capital, the members are in favor of forcing the railway company to either waive their rights of controlling streets on which they have built lines, or to establish omnibus lines and operate them as part of the railway system.

While European omnibus manufacturers would make a strenuous effort to secure the contract for furnishing these buses, it is believed that

American manufacturers could supply them at much lower prices, and of better quality. American manufacturers should instruct their representatives in Bombay to keep in close touch with the situation.

United Kingdom Exports and Imports

SEPTEMBER imports of passenger cars amounted to 1526 and exceeded the August total of 1288. Imports of chassis for passenger cars and trucks were 1094, as against 958 in August. The September figures for trucks and motorcycles, however, were 70 and 32, a decrease from the August figures of 88 and 108. Motor car parts were valued at £286,539, as compared with £441,046 in August. Taken as a whole, the September figures all the way through, show substantial increases over the same month of last year. British exports decreased during September, except for the items of trucks and motor car parts, although all export figures are well above those for the corresponding months during the past few years.

Denmark to Use Railcars

DECISION has just been reached by the Danish State Railways to introduce motorized trains.

The first railcar to be constructed for the Danish State Railways will be of 75 horsepower, and will have seating accommodations for 32 passengers. It is also planned to build smaller motor train engines, the idea being to use two of these in a motor train, one at the front, and the other at the end of the train—in between will be located trailer cars having seating accommodations for passengers. It is calculated that a train of this type will carry about 80 passengers. It is expected that the motor train engines and cars and railcars will be completed in three or four months.

Motorcycle Market in South Africa

ALTHOUGH imports of motorcycles have increased since 1922, imports from the United States have decreased. This decrease in American imports is mainly attributed to the growing popularity of the light weight British machines, energetic salesmanship, and increased advertising.

The Orange Free State appears to offer an especially good field for the sale of motorcycles, as this province with a white population of 194,000 has only 767 machines, as compared with 3033 machines in Natal which has 47,000 less white inhabitants.

Bigger Loads on Multi-Wheeled Vehicles Urged to Relieve Congestion and Preserve Roads

Problems of designing six and eight wheel buses and trucks and the reasons for their development discussed at Metropolitan Section Meeting. Question of differential between driving axles.

TWO problems stand out among the many that confront the designer of commercial vehicles with more than four road wheels, to judge from the papers presented and the ensuing discussion at the December meeting of the Metropolitan Section of the S. A. E.

One has to do with the layout of the brake linkage, which involves serious difficulties when brakes are to be applied on the four wheels of a rear body that has considerable freedom relative to the chassis. The other involves the question whether, when the drive is applied to two axles at the rear, it is necessary to divide the power between them by means of a differential. On this latter point there was shown to be considerable difference of opinion. As regards the brake problem, the opinion was voiced that air brakes and hydraulic transmission of the braking force afford means of overcoming the difficulties.

The two scheduled papers of the evening were by A. W. Herrington, chief engineer, Engineering and Designing section, Motor Transport Division; and A. F. Masury, chief engineer, International Motors Co. Mr. Herrington outlined the conditions which led to the development of six and eight-wheeled road vehicles. He said not enough experience had been accumulated as yet to lay down hard and fast rules regarding their design, but he firmly believed that there was a future for them. We are rapidly approaching a condition on our highways similar to that met with by the A. E. F. in France. Owing to the intensification of heavy traffic, our roads are being worn out rapidly and there is a tendency on the part of the authorities to pass restrictive measures. As an illustration of what this may mean he said that the Engineer Corps in France hauled no less than 358,000 tons of road building and repairing material, and that, if it had not been for the rapid road wear, an equal amount of other material might have been transported instead.

Solution for Congestion

Another condition that is confronting us is the increasing congestion on our roads. To relieve this congestion we will have to carry larger loads and occupy less road space. Multi-wheeled road vehicles are by no means a new idea. He investigated the patent situation and found that the first patent for a motor vehicle with more than four road wheels was issued in 1896, since which time something like 250 other patents under this heading were issued. Most of them related to details or peculiarities of construction and he was sure there was no basic patent covering the use of more than four wheels.

One reason why the War Department was interested in multi-wheeled vehicles was that they made possible an important saving in the consumption of rubber. No rubber is produced within the Continental area of the United States, about 85 per cent of the rubber supply of the world now coming from the islands of the Pacific, and it is not inconceivable that in case of war we might be cut off from our chief sources of supply. Figures were cited

to show that the amount of rubber actually lost or worn away from the tires was less in the case of a pneumatic-tired six-wheeled vehicle than in that of the Class B truck with four solid-tired wheels.

Increased Deceleration

Another advantage of the six-wheeled construction is that it makes possible greater deceleration or braking power. Mr. Herrington said that the maximum deceleration of the Class B truck was 8 ft. p.s.p.s. when the brakes were in good condition and the road surface was such as to give good adhesion, and for average conditions he placed the deceleration of that truck at 7 ft. p.s.p.s. With the six-wheeled pneumatic-tired truck, in which the brakes acted on the four rear driving wheels, a deceleration of 16 ft. p.s.p.s. had been obtained. The deceleration or braking power, of course, affects the maximum speed at which the vehicles can be operated with safety, and Mr. Herrington figured that under certain assumptions, when the trucks are being run in convoy, the six-wheeled truck could safely be operated at 16.1 m.p.h., as compared with 7.3 m.p.h. for the Class B truck. The assumptions made were that the trucks were being run with a certain headway and that it should be possible to stop a truck in the distance separating it from the one ahead.

One of the chief advantages of the six-wheeled truck is that, as compared with a four-wheeled one of the same total weight, the ground pressure is much lower, and Mr. Herrington said that with the 5-ton six-wheeled truck the maximum subsoil pressure was no greater than with an ordinary 1½-ton truck.

Describing some of the mechanical features of the Quartermaster Corps truck, the speaker said it drove through the two axles at the rear and that these were in positive driving connection, no differential gear being used between them. On the other hand, in an eight-wheeled chassis built by the California Transit Co. there was a differential between the two driving axles. Opinions as to the necessity for a differential differed. Some people considered the driving wheels to be geared to the road, but some experience he had had with Class B Army trucks convinced him that the differential was not as essential a part of truck mechanism as it was generally thought to be.

It appears that during the war, in order to obtain conclusive evidence on the question as to whether a truck can be successfully operated without a differential, a total of ninety-four Class B trucks were assembled without a differential in the rear axle, and these trucks were "purposely lost" among the Army trucks. In the course of the past year he had had a letter from a camp in Texas, informing him that they had had occasion to take apart the rear axle of a Class B truck and had found that it had no differential. The intimation was made that the War Department had good grounds for recovering damages from the manufacturer who had assembled the particular

truck. Mr. Herrington said he wrote to his correspondent, informing him of the facts in the case and suggesting that he reassemble the axle in the same way and place it back in service. A similar letter had come from California, where some of the Class B trucks were used in road construction.

Here were two trucks without a differential in the rear drive, which had been in service for something like six years before anybody discovered that they were not "regular" in every respect. In addition, some of the Nash quads used in France during the war had had the differential eliminated and never gave any trouble. He had been pleased to note that the English in their recent four-wheel military tractor (described in A. I. of Dec. 11) had dispensed with the differential between the two driving axles.

Brake Connections Offer Difficulties

The connections to the brakes on a trunnion-mounted rear bogie, Mr. Herrington said, involve great difficulty, as the connection between the bogie and the chassis frame is so flexible. Summing up the advantages of the six-wheel construction, Mr. Herrington said that it would increase the pay load per square foot of road occupied, improve the braking power, give a better proportion of pay load to total load, decrease accidents, speed up traffic and lessen congestion.

Mr. Masury said that developments in the commercial vehicle field paralleled those in the railroad field. The railroads had long since discarded four-wheel cars, and today they used more wheels and carried greater loads per car. In road work where large units are employed more than four wheels must be used in order to limit the axle load and the destructive effect on the road.

Another question that came up was that of taxation. He held that the roads were public property and that the vehicles using them should not be taxed except for road maintenance purposes. In his estimation a proper basis for the vehicle tax was the weight per inch of tire width. In bus work a great advantage of the multi-wheeled construction was that it afforded greater riding comfort.

Going into some of the details of the six-wheeled bus chassis built by International Motors Co., Mr. Masury said it had a differential between the two driving axles and he considered this to be a feature of great importance. It permits of lightening the driving shafts, prevents sharp acceleration and deceleration of the propeller shaft when one wheel passes over an obstacle, prevents skidding and compensates for differences in the effective tire diameters under load.

Special Servo Brake Developed

Mr. Masury said his firm had worked out a servo brake, which he considered to be essential on a large, heavy, high speed vehicle like this. He explained that the brake connections were carried through the trunnion mounting and that since, from that point on, the connections ran parallel to the axles, there was no difficulty from the flexible connection between the axles and the frame. They had also worked out a special bus seat which is suspended as a whole on airplane rubber cords.

The discussion was participated in by Mr. Templin, who did the engineering work on the six-wheel truck developed by the Goodyear Tire and Rubber Co. some years ago, which work is now being continued by the Six-Wheel Co. of Philadelphia. The original truck has now run 96,000 miles. Recently some of these six-wheeled chassis have been shipped to Detroit where they are running under double deck buses.

William P. Kennedy briefly described a bus built on the tractor and semi-trailer plan, in which there is a spherical cowl which practically hides the joint between the tractor

and trailer from view and makes it appear as one vehicle. The floor of the trailer is on a considerably lower level than the coupling.

Representatives of the California Transit Company and of the Capital District Motor Bus Co., Albany, N. Y., also spoke, the former giving some details regarding the eight-wheeled vehicles built by his concern and the latter of a gasoline-electric bus. R. E. Plimpton gave the bus operator's viewpoint of multi-wheeled construction and showed some lantern slides of six-wheeled buses that were built abroad.

British Gasoline Consumption

BULK cargoes of gasoline were first received in England in 1902, the first tank steamer to carry the fuel in bulk having arrived in February of that year. Adequate supplies were established only the following year.

In the early days of the oil tanker such vessels were not allowed to use the Suez Canal and those coming from Sumatra were compelled to pass around South Africa.

Before the advent of the automobile the demand for the lighter fractions of petroleum was insignificant, and it was customary in Sumatra to pump these light fractions out into the jungle and burn them to waste. The quantity of gasoline imported into England during the year 1903 amounted to 33,008 tons, while ten years later, in 1913, the imports were more than ten times as great, amounting to 342,905 tons.

Steady increases year by year brought the imports up to 1,341,564 tons by the end of 1923, which is about forty times the quantity imported in 1903. Notwithstanding the trade depression the gasoline trade still continues to increase and a country-wide system of distribution has been established.

The tremendous increase in the gasoline trade has resulted chiefly from the development of motor transport. In view of the fact that in Great Britain there is as yet only one car to forty-three heads of the population, while in the United States there is one to every seven, the business seems to be capable of much further extension. The United States at present uses about twenty times as much gasoline annually as Great Britain.

IT has long been known that glycerine absorbs water from liquids and vapors with which it is mixed and retains it on distillation, and the thought occurred to Dr. E. Knecht and Dr. E. F. Muller of the Manchester College of Technology that commercial alcohol might be dehydrated by making use of this principle. The experiments were entirely satisfactory and the method seems to be practical and economical.

The tests have shown that there are two possible causes of trouble that must be guarded against. The glycerine, in addition to the water, may retain some alcohol, and traces of glycerine may pass over with the vapors and contaminate the alcohol, although the boiling point of pure glycerol is 550 deg. Fahr. It was found that by distilling the alcohol-glycerine mixture twice or by modifying the original process both of these difficulties could be overcome.

A similar process developed by Mariller in France was described in *Chemit et Industrie* some time ago. Mariller works with alcohol vapors, while Knecht and Muller mix glycerine in the proportion of 25 per cent with alcohol containing 10 per cent of water. If the alcohol contains less water less glycerine will suffice.

Enclosed Electric Drive and Friction Clutch Feature New Milling Machine

Lever-controlled clutch is used in conjunction with motor enclosed in base of latest Milwaukee miller. Power-operated rapid traverse and handy control. Use of special fixtures.

By W. L. Carver

TO the well-known all-gear drive, characteristic double overarm and automatic oiling provisions, Kearney and Trecker in their latest type of Milwaukee milling machine have added several other striking features, including an enclosed electric drive (used in conjunction with a lever-controlled friction clutch), a power-operated rapid traverse with a simplified control and an arrangement of working control levers which makes them convenient to the operator.

As shown in Fig. 1, a standard electric motor is mounted on ways in a compartment in the base of the machine which has a hinged cast iron cover. A pinion mounted at the inner end of the armature shaft meshes with the main driving gear of the gear set, all members of which are of hardened steel. Brushes and commutator are located at the outer end of the motor shaft and therefore are easily accessible for maintenance purposes. Ventilation of the motor compartment is assured by a plate with louvres, at the side of the machine. Exhaustive tests under extreme conditions have failed to show any overheating. The friction clutch is located just back of the main driving gear, with the control carried to an adjustable lever.

Speed and feed changes are controlled by the levers on the side and back of the column. However, all of the controls which are required for the cycle of a given operation are carried forward to the front of the machine, with consequent reduction in footwork for the operator. In addition to the usual milling machine controls there is a power rapid traverse. A lever directly at the front of the table controls the direction of the rapid travel, while another lever at the right makes the selection between the rapid traverse and cutting feed.

A Line of Eight Sizes

A tank located at the right of the motor housing (Fig. 2), in conjunction with a feed line and a slip-jointed return line, provides an ample supply of coolant to the cutting edges. An oil pump built into the bottom of the gear box circulates oil to all bearings and gears of the driving mechanism. Liberal oil wells provide lubrication for the table and ways. This type of machine is built in 8 different sizes as follows:

No. 2 AS Manufacturing	No. 2 B Plain
No. 2 A Manufacturing	No. 2 B Universal
No. 2 BS Plain	No. 3 B Plain
No. 2 BS Universal	No. 3 B Universal

The friction clutch is standard in all models and the power rapid traverse is standard on all sizes with the exceptions of Nos. 2 AS and 2 BS. While the line has been designed primarily for manufacturing purposes, the makers state that it also embodies the element of accuracy to enable it to meet tool room requirements.

Some recent adaptations of Milwaukee milling machines will be of interest in this connection as they are in-

dicative of a trend in many manufacturing plants. While these do not involve the electrically driven machine, the basic characteristics are common to both types and serve to demonstrate the tendency toward the adaptation of a standard machine plus specialized fixtures or heads or both to the demands of special operations. In case of the redesign of the production piece, the fundamental unit, the machine, is available for subsequent production work of a different kind, while the special equipment with the attendant investment is not such a large item in the service equipment account. The basic unit is utilized in current production and is available for the production of service parts during slack periods. The flexibility of the shop equipment and the secondary character of the service equipment both cut down tied-up capital.

Set-ups for Automotive Jobs

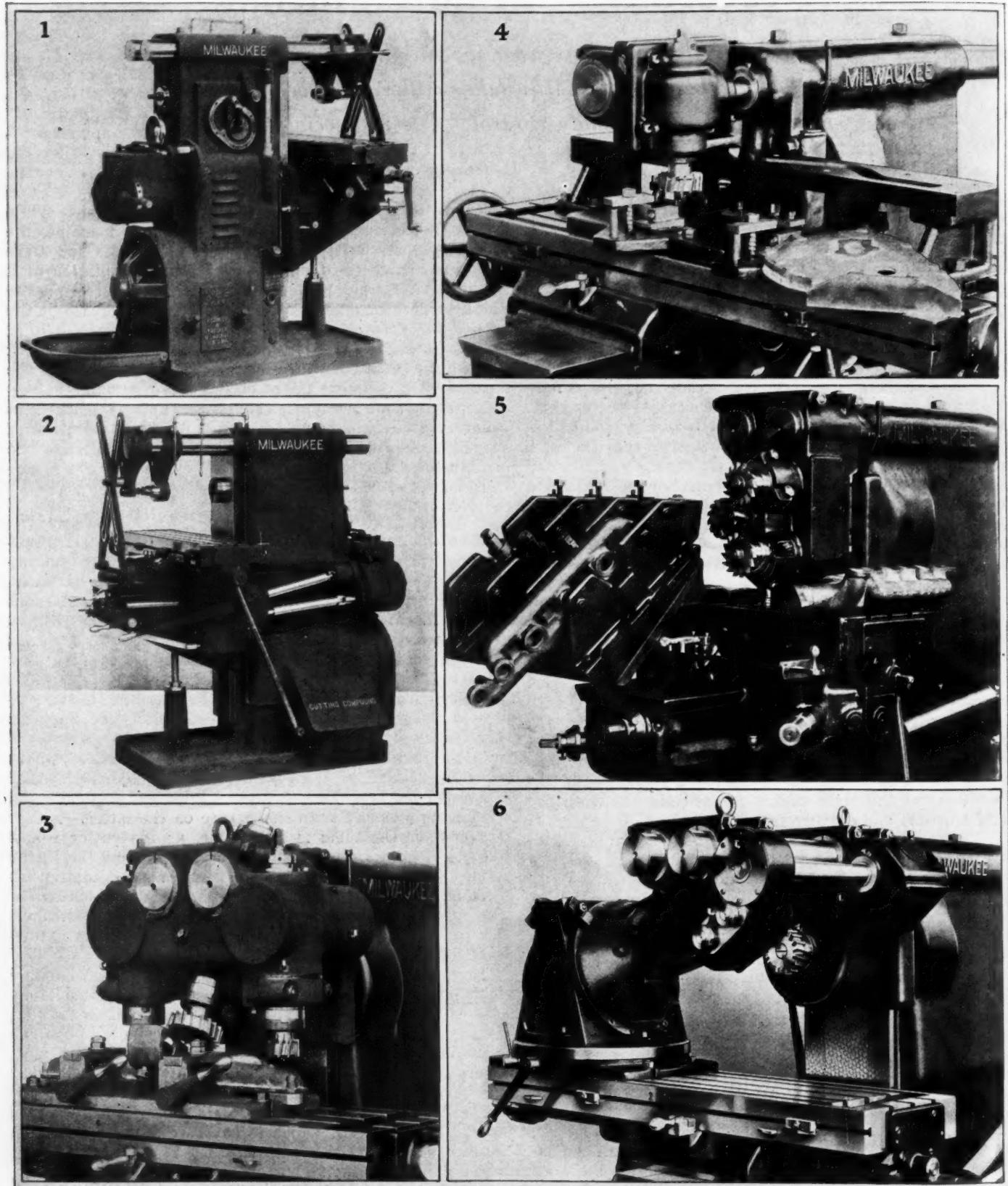
The adaptability of the combination of a standard machine with special equipment is demonstrated by the accompanying illustrations. Allowing for possible variation in machine sizes, any particular set-up can be transferred to the machine shown for a different operation. Fig. 3 illustrates a special three spindle head which is designed for milling the faces of the exhaust manifold of a new eight-in-line engine. As the production rate on this piece is not high and the machine is to be operated in conjunction with another by one man, the routine is the simplest. Two quick-action levers actuate the hold-down clamps.

A similar machine but an entirely different set-up is illustrated in Fig. 4, in which a single spindle special vertical head is shifted at right angles to the table by a cam plate mounted with the fixture on the latter. Direct traverse of the table is impossible, as the cutter would not clear the projection on the casting. Moving the entire table in and out for each piece is not a good continuous production method, therefore the cam plate which shifts the cutter head was evolved for double end operation. The operator loads the idle end while the opposite fixture is under the cutter.

In Fig. 5 the face and bolt bosses of an exhaust manifold flange are finished at a single pass by the combination of a standard machine, a special head and an angular fixture. The distance between the cutting faces is equivalent to the thickness of the bosses at the manifold flange. Operation here is continuous, as each of the three stations can be reloaded as the cutters are cleared.

Straddle milling on a gear box is accomplished by two special heads, one of which is outboard, and an indexing capstan fixture, as shown in Fig. 6. The outboard head, which drives two facing cutters, is anchored on the double over arm and driven by an auxiliary shaft which is driven by a gear train enclosed in the head on the column. Operation in this case is by end feed. As the cut is completed, the table is moved out by the rapid traverse and indexed for repetition.

New Milwaukee Milling Machine and Some Set-Ups



— Fig. 1—New design of Milwaukee milling machine, showing drive by enclosed motor. Fig. 2—Another view of the machine, showing tank for cutting compound at the side of the motor housing. Fig. 3—Face-milling exhaust manifold by means of three-spindle head. Fig. 4—Cam plate on table fixture moves single spindle vertical head at right angles to clear projection on work. Fig. 5—Finishing face and bolt bosses of exhaust manifold flange at single pass. Fig. 6—Straddle-milling transmission case

There Is No Shortcut to the Promised Land of Increased Sales

Advertising is just a job like bookkeeping or bricklaying. Styles may change and magic formulas may have their day but the man who catches the most fish is the man who fishes most.

By Earnest Elmo Calkins*

WHEN I began my work thirty years ago, the most conspicuous symbol of advertising was the picture of Old Doc Munyon, with upraised finger, declaring, "There is hope." Since then many a style has become the fashion for a season.

Advertising is as much afflicted by changes of fashion as millinery. Jingles, imaginary characters like Phoebe Snow, slogans, coined names, reason why, psychology, double-page spreads, market investigations, atmosphere, dealer influence, merchandising, art typography, are among the magic formulas that have had their day, and left something useful behind them, perhaps.

But none of them seemed to do away with the original truism that advertising is just a job, like bookkeeping, or bricklaying, or banking, and that one great underlying principle which has not yet been abrogated or superseded is that the great power of advertising lies in its persistency, in its continuity; that no matter how you do it, or what your pet talking point, or copy appeal, or keynote, you must keep right on doing it, day after day, every day; that there are no short cuts, or royal roads, or northwest passages to the promised land of increased sales, and that advertising, like any other living thing, like a bank, or a bay tree, or a baby elephant, is subject to the laws of growth—every little added to what you got makes just a little more.

Many people even to this day do not believe this, and are still seeking, like the angel of the old schoolmen, to go from point to point without passing through the intervening space. A recent cartoon showed a plump lady consulting her doctor. "You will have to diet," he tells her. "Oh, I thought there was an operation, or something easier," she moaned.

There is a whole book of advertising in this incident. The late George P. Rowell, that shrewd old philosopher, said on the same subject: "I have fished much during my life, and heard a lot about the best way to fish, the best flies, the best times, and the best places, but I've noticed that the man who catches the most fish is the man who fishes most." That was many years ago, but it is just as true now as when he said it, and it will be true when I get through talking.

Advertising as Excellent as Modern Car

Advertising today is as much better as a new Cadillac is than the weird contraption that Henry Duryea drove about the streets of Peoria, but it is almost defeated by its own efficiency.

Newspapers and magazines get bigger and bigger, with single advertisements running two and four pages an issue, advertisers grow restless and change agents more

frequently in the relentless search for a new idea which will make the generous space even more potent in selling goods.

Some products, especially foods and toilet articles, have received such relentless exploitation one wonders if they are not already scratching gravel from the bottom of consumer demand. The grocer and druggist scratch their heads and look despairingly at their crowded shelves when asked to find place for another breakfast food or a new tooth paste.

Two million new customers are born every year, but so prompt is advertising and so thorough and efficient its methods that it uses them up faster than nature can supply them. The demand exceeds the supply.

In the early days the only question about advertising was whether it would sell goods, just as the only question about a motor car was whether it would run. Today the motor car is hard put to find a place to run in and advertising is almost at the point where it must find new worlds to conquer. Almost—but not quite.

There is no crisis yet, but anyone who looks ahead in advertising, or in the motor-car market, must see that the time is coming when there will be no place to park the advertising. I leave the problem with you.

There are at least two thousand advertising agencies in this country, some with a dozen people, some with hundreds. The clients of these agencies are manufacturers who, as they employ agents, must be more or less

"Two million new customers are born every year. Advertising is so prompt and efficient that it uses them up faster than nature can supply them."

interested, and the whole establishment becomes conscious of advertising, especially in these days when it is the practice to sell the house's advertising to the whole force.

There are more than a million dealers, and it is safe to say that every one of them has listened to at least one lecture on advertising. The dealer's clerks are included, especially where the dealer is an advertiser on his own account, and insists that his staff shall be familiar with the advertising of the house.

Some of the department stores maintain advertising departments as large as those of the biggest agencies. Clustered around the agencies is an army of camp followers, artists, engravers, printers and electrotypers.

*Excerpts from an address delivered before the Convention of New England Advertising Clubs.

Next consider the mediums. Trade journals, newspapers, magazines, street cars, poster-boards, painted bulletins, and novelties, and to some extent the movies and the radios. Another vast force is needed to keep up the advertising end, run the plant and sell the space.

Think of the street fairs, carnivals, lodge picnics, charity bazaars, police athletic meets and church socables, each with its program in the hands of eager solicitors selling space to local merchants.

Here is a large public. Each of these agents, advertising managers, manufacturers, dealers, salesmen, clerks, artists, printers, photographers, poster people, students, is a part of a family. The older ones are married and have wives and children. The younger ones live in the homes of their parents.

And in each family circle there is an unusual and sophisticated awareness of advertising due to the fact that the bread-winner gets his living, or part of it, or has his chief interest in advertising.

What is the attitude of this public? Does it help or hinder? Does a knowledge of advertising make people susceptible or skeptical? Are advertising men influenced by advertising? Do priests believe in their church?

Is the stage storm less impressive after one has seen the thunder machine work? Will advertising be bettered by the spread of this inside, behind-the-scenes knowledge of the machinery by which the effects are produced?

I do not know, but I think much depends on the attitude of advertising men toward their own work. On their sincerity, their honesty, on their own belief in what they sell. Their attitude will affect all their dependents.

You hear of the newspaper men's newspaper, the novelist's novel. What is the advertising man's advertising? One is reminded of Grimaldi, the great clown, who consulted a doctor because of melancholia. "What you need," said the doctor, "is a good laugh. Go and see Grimaldi act." "Alas!" was the reply, "I am Grimaldi."

Just so sure as sacred cows are foddered among us, just so sure as we take ourselves too seriously, and forget that advertising, like every business, is largely common sense, and no more a mystery than bootlegging or baking, even if we fool the advertiser, the man who pays the bills, we cannot fool this growing advertising public, which gets its dope from the inside, and forms so large a part of the consuming public which is our court of final appeal.

Bunk in Advertising

What I have called bunk manifests itself in copy, just as much as it does in other phases of advertising work. I am perhaps more conscious of it there than elsewhere because of my belief that copy plays a larger part in successful advertising than is commonly held, especially in these days when perhaps more care is given to preparing the ground than in sowing the seed.

Advertising copy shows a tendency to harden into what the French so expressively call "clichés." "Clichés" is the French word for "stereotype"—stereotyped expressions of the hard-worked copy writer without sufficient material and barren of inspiration.

The commonest form of the "cliché" is the meaningless superlative—the bests, unequalseds, unsurpassededs, which are in themselves a confession that there is nothing to write about.

There is no material with which human beings work which has so much potential energy as words. In their selection and their grouping lies all the power of advertising. No matter how thoroughly the preliminary work may be done, it finally results in a plan that must be

expressed in copy. It all becomes worthless unless the copy has the vital spark, unless it fires the imagination of the reader.

Articles advertised may be roughly divided into two classes—those that have some distinct, demonstrable advantage—a monopoly, as it were—and those that differ from their competitors slightly.

The latter are by far the larger class, because they comprise nearly all the staples of existence. In the beginning of advertising this was not so apparent, because each line was represented in advertising by only one or

"We take ourselves too seriously and forget that advertising, like every business, is largely common sense. It is no more a mystery than bootlegging or baking."

two examples, but as an advertiser of any given line became successful, others making that same article became advertisers, and soon it was realized that they were all telling the same story.

The net result of such advertising was not so much selling the advertiser's individual product as making a market for that kind of goods.

Out of this situation has grown cooperative advertising, which is one of the significant signs in the advertising world and will be heard from in the future. At present inherent selfishness and vanity hold it back in spite of noteworthy successes where it has been tried.

Meanwhile what is that advertiser to say in his advertising who has nothing to say? How can he interest a bored and sated public without a fresh and vivid story?

It means that where there is no individuality in the goods, there must be that much greater personality in the advertising. It means that the English language, the vehicle that you use, is bigger and wider, and deeper, than the needs of all the advertising of all the products that the world can produce. It means, in short, that advertising has just begun.

I am as far as possible from being a pessimist, but I do not think that optimism consists of ignoring problems, but in grappling with them.

The next generation of advertising men has an interesting program. What we have done is nothing to what they will do. They must realize that advertising is a very different thing from what it was a quarter of a century ago; that with all the changes that have been brought about by different ideas and ideals, new inventions, new habits, new wants and new standards of living, advertising itself has brought about its own greatest change, and that while advertising is more expensive than ever it continues to be more necessary than ever.

The machinery of advertising is presented to the next generation as a going concern. It has not outlived its usefulness. It has not reached its zenith. On the contrary, it is just beginning to realize its power, to vision its possibilities.

But the only way to realize that vision is to take account of conditions as they exist, to realize that the world in which we work is a shifting kaleidoscope, always presenting new patterns. Every day is a new beginning. Every day is the world made new. We should keep our feet on the ground, but our heads well above the clouds.

EDITORIAL

A Significant Move

URGING that the Boston & Maine Railroad drop 1000 miles of track which has been made unprofitable by motor vehicle competition, Homer Loring, chairman of the Executive Committee of the road, announces that the rail carrier has organized a subsidiary company "to assist with motor service in caring for the needs of the communities involved."

The attitude revealed by Mr. Loring in making his recommendations is significant as reflecting the progress achieved in generating a real spirit of cooperation among various transportation interests. Mr. Loring advocates abandonment of some of the tracks of his railroad because it has become uneconomic to operate them longer. The service which they once rendered now is being given more effectively by another form of transportation. Mr. Loring does not blame that other form of transportation; he simply states the facts and accepts them as such. And then he goes further by urging his company to make use of that new transport agency in serving the public.

Definite progress is being made in improving the approach to common problems as well as in the mechanical aspects of coordination of rail and highway transport.

Encouraging Words

WHEN sales come hard and profits aren't high, the automobile industry sometimes begins to think that it isn't appreciated as much as it should be. There comes a suspicion that the relatively low prices and constantly improving performance which are being given to the public are being accepted as a matter of course, rather than with appreciation of the fact that we have exceeded many other industries in this respect.

But once in a while a pat on the back arrives that encourages enormously. Here is a thought for the New Year from the Greenville, Ky., *Record*:

"American manufacturers of automobiles are recognized as the keenest in the world, and they are becoming recognized as the most far sighted men in any line of business in this country."

"It is a wonderful position that has been gained by this industry. Only about a quarter of a century old, it has gone right to the forefront among our industries. There are several reasons for this condition.

"To begin with, the automobile is an article that appeals to practically everybody. It is a necessity in business, and for pleasure is alluring.

"But perhaps the one main feature that causes continued growth is that there is no jockeying for higher prices. The only revisions that have been made in prices are downward. And at the same time the quality and appearance of cars have been developed.

"The great auto industry cuts prices and raises quality. Other concerns cut quality and raise prices. There is nothing mystical about the wonderful growth and continued development of the motor group—it is a natural economic proposition."

Raising Road Funds

DISPOSITION of funds collected by States from automobile license fees always has been something of a moot question, although it has been accepted almost as an axiom that such money should be applied to road work of some kind. This principle has been accepted by most of the States, but in several instances tax fees have been diverted to activities having nothing whatever to do with roads or improvement of conditions for vehicle drivers. There is danger that similar action may be taken in some places in the future, because of the tendency to collect taxes where it seems easiest to get them rather than from those sources which properly should be expected to pay.

This tendency is being discouraged by students of tax questions. It seems only fair that special taxes, such as those imposed by the State on automobile owners, should be devoted entirely to purposes which will benefit those paying the special assessment.

Views have changed somewhat in recent years as regards detailed expenditures of automobile tax money. There was a general belief for some time that this money should be used only for maintenance of highways and that construction of highways should be financed by bond issues or other general means. It is admitted today, however, that good roads are needed so badly in many places that it is advisable in some cases to raise money for their construction in the quickest way and that automobile taxes may furnish that way.

Large or Small?

THE efficacy of general sales conventions is undergoing investigation along with the other items which help to pile up marketing costs. There can be little questioning about the desirability of getting groups of dealers and distributors together for the purpose of discussing common problems with the factory sales executives.

There is considerable question, however, as to whether or not a general meeting can do the job as well as sectional gatherings.

A number of executives of industrial and commercial organizations think that a sales conference of not more than fifty men makes possible the maintenance of a reasonable degree of intimacy, according to *Printer's Ink*.

Our Industry Today—

Resumption on Larger Scale in January to Follow Reduction in Programs for December—Curtailment by Quantity Producers

NEW YORK, Dec. 22—Decline in passenger car production in November, when output reached the low point of the year, is attributed largely to the curtailment of schedules by several of the largest quantity producers rather than to any inroads on the programs of some of the smaller makers. In the falling off of production of the last few months the latter producers have not been so greatly affected as have those manufacturers normally operating under large schedules.

Continuance of reduced programs by the larger makers will bring December output figures below those of November. This month will also see somewhat of a let down on the part of the major portion of the manufacturers, with every prospect held out, however, for a resumption of operations on an extensive scale after the first of January.

Plants making parts are reported to be showing signs of renewed activity as are other factories whose operations depend to a large extent on the capacity of the automotive industry to absorb its output. Facilities are being augmented to take care of the increasing demand from automobile producing plants. Employment conditions in the sections where parts making plants are located are improving and a firm demand for skilled workmen has again appeared.

Replenishing Inventories

Passenger car makers are going forward in replenishing their inventories but they are displaying greater caution than in previous years. A leading factor in this element of buying is the knowledge that parts and materials can be obtained at comparatively short notice and that no trouble is expected in moving the supplies purchased. The buying that is going on, however, is sufficient to move parts and material schedules forward to an appreciable extent.

Retail sales of passenger cars are being well maintained, the lull in buying that usually appears at this season showing itself this year. No stopping up in demand is to be expected until after the show season starts next month. The attention of all the industry is being directed toward the opening of the New York show.

Gain Likely After Shows

Indication will be given at that time of the probable prospects for next year's business, or particularly for business in the early part of the year. The feeling is general that because of the slow business of recent months and the generally improved feeling prevailing among prospective buyers the first quarter of 1925 will see vast gains made in the number of cars going into the hands of owners.

Plants Close Down for Inventories

Makers Ready for Rush of Purchasers of Low Priced Models —Price Situation Quiet

DETROIT, Dec. 24—General production in the industry will be brought to a close this week in many plants to permit of inventory taking and equipment overhaul. During the holiday week most of the production activity will be by companies which are bringing out new models for the shows and which are speeding up for early year shipments.

In practically all other plants there will be a general let-up in preparation for early year activity. Retail sales throughout the country have shown the customary December falling off, though many factories report excellent business on low priced closed cars. Bad weather during the month in many parts of the country has confined business to a large degree to models of this type, other models getting only a scattering of the buying.

Manufacturers producing models of this kind are looking for a big early year business, regardless of weather conditions. The general introduction of low priced closed cars will bring about in the coming year a period in which models of this kind will dominate the buying.

According to manufacturers' expectations, there will be a general changing over of ownership from open to low priced closed cars in the coming year, the main merchandising problem being to find an outlet for the trade in open cars.

The price situation has quieted down after a brief period of speculation, and there is general expectancy that increases will be in order from this time, rather than further reduction. The price level reached in the fall months will probably again become effective as spring buying is extended, with possibly a slight shad-

ing in the prices of the low-priced closed cars, but increased in the open and high-priced closed line.

This will be governed, manufacturers declare, by the market influence upon production facilities. To some extent the early year will witness somewhat of a readjustment in the general price classes of some manufacturers, with probably the greatest competition in some of the lower price classes.

Heavy demand for closed models in the low-priced lines, as in the \$1,000 and medium prices, but even here closed car buying is expected to run ahead of open.

This is especially so in the buying in the United States. Export shipping will continue heavy in open car models.

Canadian Dunlop Company Elects E. B. Ryckman

TORONTO, ONT., Dec. 22—At a meeting of the directors of the Dunlop Tire & Rubber Goods Co., Ltd., Toronto, E. B. Ryckman, K. C., M. P., vice-president, was elected president, to succeed Warren Y. Soper, deceased, who had been president since the inception of the Canadian company in 1899. J. Westren, general manager and secretary-treasurer, was elected vice-president and general manager, and A. E. King, assistant general manager, was elected secretary-treasurer.

Mr. Ryckman has been associated with the rubber industry for a number of years. It was through his efforts that the Dunlop rights for America were secured in 1899. Mr. Ryckman also organized the Dunlop Tire Co. in 1890, and has been vice-president for 25 years.

J. Westren has been with the Dunlop company for 29 years.

A. E. King was appointed assistant general manager of the Dunlop Tire & Rubber Goods Co., Ltd., the successor company, in 1912.

French Raise Import Duties on Automobiles

NEW YORK, Dec. 24—According to advices received here from Paris, automotive products suffer heaviest in the revision of import duties made by the French government. The bill, providing for the revision of the tariff, was drawn by the Customs Commission and will be presented for ratification after the budget is voted.

Automobiles, whether stripped chassis without tires or finished cars, will pay from 1800 to 3600 francs per hundred kilogram weight, according to the size of the car. Spare parts are assessed at from .900 to 2.250 and from 3,600 to 7,200 francs per hundred kilograms, according to classification of metal, whether of cast iron, steel, copper or bronze.

Ford Year's Output Placed at 2,000,000

Domestic and Foreign Figures Included in Total—An Increase of 600,000

DETROIT, Dec. 24—Ford Motor Co.'s domestic production for 1924 will run approximately 1,810,000, or about 100,000 less than last year. Up to Dec. 1 the total was 1,706,432. December production is considerably reduced, owing to the Christmas closing, but will approximate the 100,000 mark, below which the company has gone since March, 1922.

The above figures include cars and trucks made in the United States. With the export totals this figure will be augmented considerably. It is almost certain to pass the 2,000,000 mark, in view of the increase in business in most foreign countries during the year.

The totals, despite some reduction from the 1923 figures, will exceed figures of all other years by upward of 600,000.

In closing its main plant this week for inventory, the company is following a precedent established when the fiscal year was changed to conform with the calendar year. Many of the assembly branches about the country will continue to operate during the remainder of the year, at least in part, but for general manufacturing purposes the company has closed the year.

When the main plant is reopened Jan. 5 it will be on an increased production scale. Some departments and shop executives will continue working during the week following in getting ready for the new year's manufacturing.

Says Argentina Favors American Automobiles

TOLEDO, Dec. 19—Ellis H. Hampton, one of the foremost automotive dealers in Argentina, who is credited with having much to do with making it almost entirely an American car market, visited this city to confer with John N. Willys and other officials of the Willys-Overland Co.

Mr. Hampton may represent the Toledo company in Argentina on his return to that country. He said that of 3500 automobiles imported into Argentina in October only 80 were other than American made.

Drouth has affected conditions in Argentina during the last few months, but Mr. Hampton received a cablegram while here telling of favorable weather changes. He was formerly a president of the American Chamber of Commerce in Argentina and is a member of the American Club there.

SYRACUSE TO BUY TRUCKS

SYRACUSE, N. Y., Dec. 22—The New York State Railways, which is operating a number of passenger bus lines here, is preparing to establish motor express

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Dec. 24—Increased activity in production accompanies favorable reports of trade in many lines. Holiday buying in most sections is large. Commodity prices are generally firm, with advances predominating.

The production of iron and steel continues to increase, with buying more active and prices rising. Present output is reported to be about 80 per cent of capacity, or approximately equivalent to the rate of last spring. This is nearly double the low point of the summer.

The latest official report shows crops generally larger than a year ago. The total yield of wheat is placed at 872,673,000 bushels, or 9.4 per cent larger than in 1923, while the crop of oats is 18 per cent larger and the cotton crop 29.8 per cent larger than last year. The principal declines are in corn, 20.2 per cent, and tobacco, 18 per cent. In terms of value, all the cereal crops are larger, the total gain being 23.2 per cent. The value of all crops is estimated at \$9,479,902,000, which is 8.6 per cent above last year's figure.

Current totals of business failures show the usual seasonal increase. Bradstreet's figure for last week was 468, comparing with 358 in the preceding week and 440 in the corresponding period of 1923.

Production of crude petroleum increased again in the week ended Dec. 13, averaging 1,977,300 barrels a day, as against 1,974,800 in the preceding week and 1,943,300 in the corresponding period last year.

Bank debits to individual accounts reported by the Federal Reserve Board for the week ended Dec. 17 amounted to \$12,330,000,000, or 10.9 per cent more than in the preceding week, and 14.6 per cent more than a year ago. Exchanges at the New York Clearing House on Tuesday of last week reached a new high record with a total of \$1,615,000,000.

Fisher's index of wholesale commodity prices last week stood at 155.6, a new high mark for the year, and the highest since October, 1923.

service to places within 100 miles of this city, according to announcement by B. E. Tilton, vice-president.

The company is considering a number of kinds of trucks for the new venture.

Forging Companies Merged in Detroit

New Organization Will Use Plant Erected by the Great Lakes Company

DETROIT, Dec. 23—Through the acquisition of the Detroit Forging Co. by the interests which formed the Great Lakes Drop Forging Co. last year, a combination of the two companies has been effected under the name of the Detroit Forging Co., which will use the plant erected last year by the Great Lakes company on the outskirts of Detroit. The Superior Forging Co., an intermediary formed to bring together the two other companies, is likewise included in the combination.

Detroit Forging Co. is one of the old established companies in this line of business in the Detroit district. It was organized about 20 years ago by the late Hugo Scherer, who also was identified with numerous other automotive producing companies. The interests of the Scherer estate in this company are purchased by the new company, which, although continuing the name, is an entirely new organization.

Kingston Is President

Officers of the new company are headed by Charles T. Kingston as president and general manager. Mr. Kingston until forming the Great Lakes forging company was vice-president and general manager of John Brennan & Co., the creation of the new company following the retirement of the Brennan company from the forging business. J. F. Williams is vice-president; Andrew Backle, vice-president of Paige-Detroit Motor Car Co., is treasurer, and N. S. Masquinn, secretary.

On completion of equipment of the company's new plant it will be removed there. About 400 men will be employed. The plant is 75 x 500 ft., and is constructed entirely for quantity production of drop forgings.

Buses Complete First Transcontinental Tour

LOS ANGELES, Dec. 23—Marking the completion of the first successful transcontinental motor bus tour, three modern Pierce-Arrow motor coaches, equipped with 100 hp. 6-cylinder engines, containing 25 tourists and their luggage, arrived here from New York City. They started from there Nov. 10 and completed the trip in schedule time.

R. R. Sibley, president of the Motor-way Tours Co., who accompanied the caravan, pronounced the tour successful from every viewpoint. The schedule called for 30 days of touring. The coaches averaged 30 miles an hour. In some places trails were broken through deep snow drifts. There was only one puncture during the 4000-mile journey.

Creditors Get Assets of Standard Parts

Receiver in Fourth Annual Report Says There Will Be No Equity for Stockholders

CLEVELAND. Dec. 24—Answering inquiries that have been received from stockholders who are figuring on their income tax returns, Frank A. Scott, receiver for the Standard Parts Co., has announced in his fourth report to the federal court here that there will be no equity left to stockholders. The receiver also states that the proceeds from the sale of all Standard Parts assets will not be sufficient to pay off the creditors.

The receivership of the \$20,000,000 automobile accessory manufacturing plant which sprang up during the war has not been closed and will not be for some time. All current expense of the big corporation has stopped, however. It was discontinued on Aug. 1.

The 5 per cent dividend paid June 4, 1924, brought the total amount paid to creditors up to 75 per cent of all claims filed and allowed. A total of \$7,320,522.69 was thus paid out. The receiver reports that the average disbursements to creditors by receivers over a period of 10 years has been about 10 per cent. It was stated there probably would be another payment to creditors.

The receiver's report shows the tremendous shrinkage that takes place in the value of a corporation's assets when it ceases to be a going concern. When the receiver took charge on Sept. 1, 1921, the assets were approximately \$29,000,000 and the liabilities were placed at \$10,000,000, with a deficit of approximately \$2,000,000.

Jan. 1, 1924, the assets had shrunk to \$5,352,242 and the liabilities to \$2,397,526. The shrinkage was summarized by the receiver as follows: Reduction in liabilities by the cash payments and adjustments amounting to \$7,933,721; shrinkage in assets by adjustments and liquidation, \$14,456,810; reduction in good will by cancellation of capital stock, \$1,343,333.

In the administration of the estate the various plants were sold only after submitting offers to the creditors' committee for approval. The date for closing up the estate has not been set.

Husson Chosen to Head Motor Truck Association

NEW YORK, Dec. 24—Joseph Husson, general manager of the Motor Truck Association of America, was elected president of the organization at the annual meeting held in this city. Other officers chosen are as follows:

Hermann Irion, Steinway & Co., first-vice-president; Charles M. Geiger of Peter Doelger, second vice-president; Thomas R. Freebody, Louis K. Liggett Co., third vice-president; C. M. Billings, Vacuum Oil Co.,

MAKER EXPERIMENTS WITH WIRE WHEELS

DETROIT, Dec. 22—One of the largest passenger car manufacturers in the industry, and probably the largest user of wood wheels, is reported reliably as experimenting with a new method of manufacturing wire wheels which, if successful, will result in the adoption of wire wheels as standard equipment. These wheels in all probability will be manufactured by this company itself.

The wire wheels as now under experimentation are made with the spokes welded, a method for low cost of manufacture, as compared with wire wheels under former methods, and also permitting of a considerable saving on the price of wood wheels.

Although the saving on wood wheels will be considerable even at the outset, according to the company's estimate, they will be greatly increased within the next few years owing to greater scarcity of wood available for wheel purposes.

Announcement of the change to wire wheel equipment probably will come within the next few months if the experiments prove satisfactory.

secretary; Nat Mollouf, Mallow Haulage & Maintenance Co., treasurer.

D. C. Fenner, Mack Trucks, Inc.; E. E. La Schum, American Railway Express Co.; L. E. Campbell, La Lance & Grosjean Manufacturing Co. and Emanuel Lascaris, George W. Goethals Co., directors for three years.

John Stilwell, Consolidated Gas Co. of New York, director for two years.

Herman J. Harms, Otto Stahl, Inc., director for one year.

Rolls-Royce Reports Large Business Gain

SPRINGFIELD, MASS., Dec. 22—A decided increase of business in the last two months for Rolls-Royce of America, Inc., is reported by Harry C. Weaver, general manager. Unfilled orders are more numerous than a year ago, he said, and only three days are being allowed for the annual inventory. An increase of production is forecast for the new year.

An elaborate Christmas party was given at the plant Dec. 20, patterned after the annual celebration at the parent plant in Derby, England. More than 1000 persons attended. Gifts were distributed to 400 children of Rolls-Royce employees.

Greetings were sent from the children to F. Henry Royce.

FORD TAKES INVENTORY

DETROIT, Dec. 23—Announcement was made here of Ford Motor Co. plans to close at midnight for the annual year-end inventory to last until Jan. 5, when it will be resumed on high schedules.

Fisk Earns \$2,736,664 in Year Ended Oct. 31

Company Reports \$1.65 a Share on Common Stock Against 85 Cents in 1923

NEW YORK, Dec. 23—Net profit of \$2,736,664 after depreciation, interest, federal taxes, etc., is reported by the Fisk Rubber Co. for the year ended Oct. 31, 1924. This is equivalent to \$14.44 a share earned on outstanding \$18,951,500 7 per cent cumulative first preferred stock, on which no dividends have been paid since May 1, 1921.

Allowing for the regular 7 per cent annual dividend requirements on the first preferred, second preferred and management stock, the balance is equivalent to \$1.65 a share on the outstanding 796,882 shares of no par common stock.

The previous report, which covered ten months' operations ending Oct. 31, 1923, showed net profit of \$2,083,613, or \$10.19 a share on first preferred and 85 cents a share on outstanding 794,955 shares of no par common, after allowing for annual dividends on preferred and management stock.

In its list of current assets and current liabilities the company shows accounts and notes receivable of \$9,202,051, cash of \$2,246,056 and accounts payable of \$1,665,880.

Reo Employee Deposits Gain \$15,000 in 1924

LANSING, Dec. 22—Total deposits by Reo Motor Car Co. employees under the shop bank plan in 1924 will approximate \$130,000, a gain of about \$15,000 over the preceding year. The average number of accounts carried was 1011 and the average pay period deposit for each employee was \$5.35. The gain in strength shown by the plan is considered as making certain its permanent establishment.

In addition to the money placed in regular savings accounts, \$19,509 was deposited as Christmas savings, bringing the total savings deposited close to \$150,000.

The shop bank plan was put in operation as a substitute for the purchase of Liberty bonds and other thrift movements which Reo employees had enthusiastically supported during the World War.

PIERRE P. GILLES DEAD

SPRINGFIELD, MASS., Dec. 22—Pierre P. Gilles, for 12 years with the American Bosch Magneto Corp. as a mechanical engineer in the research department, and inventor of a successful automobile carburetor, died in this city Dec. 21. He was a native of Switzerland and in addition to being an engineer and inventor he was a skilful aviator.

Moskovics Awarded \$158,883 As Damages

Jury Returns Verdict Against
Franklin Company for Alleged
Breach of Contract

UTICA, N. Y., Dec. 20—Fred E. Moskovics, who resigned last summer as vice-president in charge of sales for the Franklin Automobile Co., Syracuse, N. Y., due to differences with H. H. Franklin, president, regarding sales policies, has been awarded a verdict of \$158,883 by a jury in the Federal Court for the Northern District of New York State for alleged breach of contract by the Franklin company and for damages for the five-year life of the contract.

The verdict of the jury was that the contract had been broken by the company. Mr. Moskovics had sued for \$397,863, a sum computed on salary and commissions for the five-year contract period.

May Make Motion Dec. 27

The court fixed Dec. 27 as the date on which the Franklin company may file a motion for setting aside the verdict on the grounds of excessive damages. The amount is said to be the largest awarded by a jury in a similar case in this district of the court.

The difference of opinion with regard to the sales policies between Mr. Franklin and Mr. Moskovics related to the announcement of the new model Franklin, Series 11, made to Franklin dealers last June, when the alleged breach of contract took place.

According to the evidence, Mr. Moskovics had an agreement with Mr. Franklin that the new model would not be announced until the middle of September, or thereabouts, which would give the Franklin dealers time to dispose of more than 5,000 old models on hand, the selling of which had been one of Mr. Moskovics' first tasks after he went with the company in February.

Old Models Cause of Dispute

The evidence showed that toward the end of May Mr. Franklin requested from Mr. Moskovics a plan for the disposal of the old models, of which more than 1800 were in the hands of dealers. The plan submitted did not meet with Mr. Franklin's approval and he decided on other methods of handling the situation, it was stated. It was alleged that he decided to announce the new model early in June, contrary to the wishes of Mr. Moskovics, who had an agreement that the new model would not be announced until the middle of September and who had visited the dealers in different parts of the country and specifically advised them of this, it was stated.

To carry out his plans, Mr. Franklin secured H. N. Ballard of Chicago, who was instructed to go ahead with the announcement of the new model, which was

MILWAUKEE PLANTS RETURN TO NORMAL

MILWAUKEE, Dec. 22—Reports of improving business find confirmation in the summaries of analyses made by economists, who in formal bulletins issued by the largest local bank reveal the fact that the automotive industries in Milwaukee and vicinity are at about a normal output once more. This embraces passenger cars and trucks, as well as equipment and parts. Industrial operations generally are on a higher plane and the outlook for iron and steel foundries and machine shops is declared promising.

It is interesting to note that there is again a firm demand for skilled workmen. The number employed in Milwaukee shops is maintaining the upward movement since the low point was passed Aug. 1.

Pay rolls of 50 typical Milwaukee industries on Dec. 1 numbered 29,140, compared with 26,436 on Nov. 1, and 24,328 on Aug. 1.

In 1923, the number employed on Dec. 1 was 30,540, against 35,776 on July 1, the peak of last year.

done on June 9 without the knowledge of Mr. Moskovics, it was charged. On that date night telegrams were sent to dealers advising them of the new model, and these telegrams were followed by letters and advertisements, it was further stated.

Mr. Moskovics received a memorandum from Mr. Franklin advising him that Mr. Ballard had been given the responsibility for selling the cars and Mr. Moskovics was advised to cooperate with Mr. Ballard and carry out his instructions, it was stated. Later Mr. Moskovics received a second memorandum from Mr. Franklin, according to the evidence, advising him that he had been superseded by Mr. Ballard. Mr. Moskovics refused to carry out Mr. Ballard's instructions and resigned on the grounds that the contract covering the responsibility for the sale of the company's products had been breached, it was stated.

Verdict Regarded as Important

The verdict is of unusual importance in that it reiterates the fundamental of the contract to the effect that the plaintiff was interfered with in the functioning of his work and thereby the substantial benefits of the contract were taken away, according to the allegation.

Mr. Moskovics was the only witness in his own behalf. He told of having advised the Franklin dealers early in the spring that approximately 7500 cars had to be disposed of and that the new model would not be announced until the middle of September, by which time the old models would be disposed of.

Move to Standardize Laws in Michigan

Vehicle Owners and Operators
Appoint Committee to Work
Before Legislature

DETROIT, Dec. 23—Owners and operators of commercial motor vehicles, as well as manufacturers of trucks and trailers, met in Lansing to consider State traffic regulations and plans. They named a committee of seven, comprising the different interests represented, to unify action in amending the motor vehicle law. New bills will be prepared by this committee for presentation to the 1925 State legislature.

Sherman T. Handy, chairman of the Michigan public utilities commission, addressing the meeting, declared the law under which commercial motor vehicles are now operating was passed hurriedly and represented the jumbled thought of a dozen different bills. He urged the bus and truck operators to standardize their rates, run their business on recognized business principles, and do away with price cutting.

"The most foolish thing you men can do," said Mr. Handy, "is to put your rates down so low that you can't make a living at it, and then, after finding this out, come to us for an increase in rates."

Members of the committee to draft the legislative proposals are C. A. Bishop, Grand Rapids; G. H. Smith, Detroit; H. W. Howard, Detroit, representing General Motors; W. A. Casey, Detroit, representing truck dealers; Wayne Taylor, Owosso, representing bus operators; W. J. Seitz, Detroit, representing the Michigan Motor Freight Line, and Harvey Fruehauf, representing trailer manufacturers.

Wisconsin Plants Prepare for Greater Business

MILWAUKEE, Dec. 22—Two large Milwaukee foundries whose production is to a large extent absorbed by the automotive industries have announced plans whereby the capacity is to be greatly enlarged to handle the increased quantity of business.

The Maynard Electric Steel Casting Co. has broken ground for a new pattern building, two stories, 77 x 100 and 67 x 71 ft., the completion of which will release considerable floor space to the foundry proper and effect a substantial increase in capacity.

The Crucible Steel Casting Co., now principally a producer of electric steel castings, will replace its entire plant between Feb. 1 and May 1 by building a new and modern foundry on a new 14½ acre site, opposite the plant of the South Side Malleable Casting Co., an affiliated concern. The main foundry will be 150 x 350 ft. It will allow of a 100 per cent increase in output. The work will cost \$350,000.

Hudson Motor Shows 1924 Gain of \$69,834

Net Income for the Year Was
\$8,073,458—December a
Record Month

DETROIT, Dec. 24.—In its report for the year ended Nov. 30, 1924, Hudson Motor Car Co. showed better earnings than during the previous year. Net income was \$8,073,458, as compared with \$8,003,624 for the preceding year. Gross profits from sales totaled \$16,247,872, against \$14,472,351 last year.

Expenses for the 1924 fiscal year totaled \$8,570,608, which consisted of \$5,719,216 as selling and general administration expenses; \$1,120,600 as provision for Federal taxes in 1925, and \$1,730,792 as other expenses, including depreciation.

Dividends paid in the form of cash and stock and reserves amounted to \$7,332,019, the dividend payments consisting of \$3 a year as the regular dividend on the common, to which were added last April 15 a stock dividend of 10 per cent and last July as extra cash dividend of $\frac{1}{4}$ of 1 per cent a share.

The company's balance sheet as of Nov. 30, 1924, showed \$12,876,721 in cash and government securities, of which \$6,000,000 was in Liberty bonds and treasury notes and \$6,876,721 in cash. Current assets totaled \$21,602,310, against \$16,400,915 a year ago, and current liabilities of \$5,430,474, against \$4,725,768 a year ago, leaving net working capital in 1924 of \$16,171,836, against \$11,675,147 in 1923.

According to R. B. Jackson, the president, December will be one of the best months in the history of the company. "You will be pleased with the profits, the substantial gains and the financial soundness which justify the cash and stock dividend policy for the year," he said in his statement to stockholders. "Outlook for the new year is very encouraging. Orders are plentiful, and our domestic and export shipments for December will total about 12,000 cars."

G. M. 1924 Exports Increase 30 Per Cent

NEW YORK, Dec. 24.—A substantial increase in exports of General Motors products will be shown this year as compared with 1923, according to a statement issued by Amory L. Haskell, vice-president and general manager of the General Motors Export Co. Indications are that the gain will be approximately 30 per cent.

The statement says that during the current year the corporation has been building up and strengthening its distributing organization overseas, and with the cooperation of its largely increased number of outlets next year promises to set new records in automotive exports.

"With the American car gaining in popularity throughout the world," Mr. Haskell says, "we can anticipate an expansion of sales of great importance to the thousands and thousands of Americans who are dependent upon the motor car industry for a livelihood.

"The theory prevalent until recently, that the United States is a self-sufficient economic entity, not dependent on outside trade, has been definitely proved to be indefensible. In all lines of production there is a part varying from 10 per cent to 25 per cent, the sale of which is absolutely essential to the profit of the entire operation. A good part of this profit-making percentage is in most cases exported, and were this overseas business shut off operating costs and, therefore, prices to the American purchasers, would have to go up.

New Company to Operate Waterloo Bodies Plant

WATERLOO, N. Y., Dec. 23.—The Waterloo Bodies, Inc., has been organized to succeed the Waterloo Body Corp., following approval by the courts of the receiver's sale of the plant, equipment and other assets to Frederick G. Stewart on Nov. 22. Stewart's bid was \$44,000.

Incorporation papers have been filed with Secretary of State Hamilton. Directors of the new concern are Frederick G. Stewart, Waterloo; E. B. Sheriff, Williamsport, Pa.; E. J. Chestnut, Buffalo; Leonard S. Zartman, Almon H. Traphagen, Charles H. Pratz, John E. Becker, Fred G. Smith, Harry W. LeClear and John Knopf, all of Waterloo.

It is expected the plant will resume work with a full force within a few weeks.

New Price List Announced by Stutz Motor Car Co.

INDIANAPOLIS, Dec. 22—Following is the new price list of the Stutz Motor Car Co., as given out officially by the factory in Indianapolis:

6-93	5-pass.	Phaeton.....	\$2,880
6-94	5 pass.	Phaeton.....	2,880
6-93	2-pass.	Roadster.....	2,880
6-94	2-pass.	Roadster.....	2,880
6-93	5-pass.	Tourabout.....	3,000
6-93	5-pass.	Sedan.....	3,580
6-94	5-pass.	Sedan.....	3,580
6-93	4-pass.	Coupe.....	3,580
6-94	4-pass.	Coupe.....	3,580
6-95	5-pass.	Sportster.....	3,535
6-95	7-pass.	Tourster.....	3,570
6-95	5-pass.	Sportbrough.....	4,435
6-95	7-pass.	Suburban.....	4,535
6-95	7-pass.	Berline.....	4,785

Packard Increases Sales in European Countries

NEW YORK, Dec. 23—Packard Motor Car Co. reports increased business with France and Germany as a result of improved economic conditions in those countries. In the period of a few months this year 25 Packards, chiefly of the straight-eight model, were sold in France, as compared with one in the corresponding period of last year. Fifty-eight cars, chiefly of this model, were sold in Germany during the period.

N. A. C. C. to Welcome Mexican Mission

Program Completed for Entertaining Automotive Men Coming to Attend Show

NEW YORK, Dec. 24—Preparations are being completed by George F. Bauer, secretary of the Foreign Trade Committee of the National Automobile Chamber of Commerce, for the reception of the Mexican Automotive Mission which is coming here to attend the New York automobile show. Men closely identified with the trade in Mexico and interested in highway development there will make up the delegation. Invitations have been extended to a number of investment bankers and representatives of financing companies in New York to meet them.

The program of activities for a two-day meeting of the mission incident to its visit here is as follows:

Tuesday, Jan. 6

- 10.30 a. m.—Assembly at headquarters of the N. A. C. C. prior to the departure for the show.
- 12.30 p. m.—Luncheon at the show for members of the Mission.
- 2.00 p. m.—Accessories export conference at the Armory. Members of the Mission and of the N. A. C. C. are welcome to attend the conference which has been planned by the Motor and Accessory Manufacturers Association, the Overseas Club, the American Automobile (Overseas Edition) and *El Automovil Americano*. Addresses will regard the aspects of foreign trade in accessories.
- 7.00 p. m.—Annual banquet of the N. A. C. C. at the Hotel Commodore.

Wednesday, Jan. 7

- 10.30 a. m.—Mexican Highways and Automotive Financing. Address illustrated by slides by Sr. Gustavo Alana, publisher of *El Automovil en Mexico*.
- "How Can Financing of Mexican Road Construction be Facilitated?" a discussion in which investment bankers will be asked to participate.
- "What Are Mexico's Needs and Guarantees for Automotive Financing," an address by Bartolo Estades, representative of B. Estades y Cia., distributor representing Packard, International Harvester Co., Nash and Oldsmobile in Mexico.
- "How Can Mexico's Needs for Automotive Financing Be Supplied?" a discussion in which representatives of banks, automotive financing companies, manufacturers and members of the Mission will take part.
- 1.00 p. m.—Luncheon at N. A. C. C. headquarters.
- 7.00 p. m.—Banquet of the Motor and Accessory Manufacturers Association, Hotel Astor.

The meetings of the mission with banking interests in this country are expected to prove of material advantage to the industry in Mexico and to the furtherance of road construction in the republic.

DATES FOR VIENNA FAIRS

WASHINGTON, Dec. 23—According to advices from the American consul in charge at Vienna, Austria, the Vienna spring fair will be held March 8 to 14 and the autumn fair Sept. 6 to 12. These fairs, it is stated, invariably include an automotive group which offers manufacturers of all countries an opportunity.

Favors Bus Control by Highway Body

Indiana Commissioner Favors Stand Taken by the Vehicle Men

INDIANAPOLIS, Dec. 22—The proposal that the State highway commission shall be the agent to administer the expected Indiana regulatory act for bus, trucks and other automotive vehicle haulers is gaining favor. A. V. Burch, highway commissioner, has come out for highway department and commission control of buses and trucks.

Mr. Burch's stand for highway control is the first note of approval the department or commission has given the bus and truck men in their demand that the proper body to govern trucks is that which knows both trucks and roads and the proper uses of both. When the subject was first broached by the truck owners more than a year ago the highway department officials seemed to feel that the burden of the control management might be too heavy.

Something that may have helped the highway department men to take this advanced position was the recent move of the Indiana public service commission in attempting to obtain control of highway relocation, and of certain other highway safety measures.

Bus sales and bus development in Indiana have reached high marks during the recent months. There have been approximately 75 deliveries of the highest class equipment to new and old operators of this vicinity in recent weeks and it is expected that between now and the middle of January shipments of almost as many more will be made into this territory.

Expected regulation by the Indiana legislature which meets Jan. 8 has prompted bus companies to hurry up shipments of equipment they will put on new lines in the hope to obtain franchises under grandfather clauses in the regulatory bill that is expected.

An era of competition between bus lines has started, with several new competing lines in this territory, and about a dozen more are expected during the next three weeks. One group, the Hiner Red Ball Lines, has four new routes in operation, with several more planned to be in service during January.

Beside this the Hiner Bus Terminal, large enough to handle at least 50 or 60 buses, with expansion room for many more, is being erected here.

PANDOLFO SEEKS RELEASE

LEAVENWORTH, KAN., Dec. 22—Samuel O. Pandolfo, former St. Cloud, Minn., automobile manufacturer, who was convicted of fraud in connection with his promotion of sales of Pan Motor Co. stock, is seeking to have his 10 years' sentence set aside on an application for

CAR-TRUCK INDEX 176 FOR OCTOBER

WASHINGTON, Dec. 23—The output of passenger cars and trucks during October of this year, according to the index survey of current business for December made by the U. S. Census Bureau, was 176, compared with 177 in September and 222 in October, 1923. The figures are based on the average monthly index figure of 100 for 1919.

Rubber tire production for October was 216, compared with 204 in September and 112 in October, 1923.

a writ of habeas corpus. He claims that a statement made by him April 5, 1919, before the Federal Trade Commission was extorted by the commission and used by the Government as evidence.

Orders Buses Equipped with Emergency Doors

TRENTON, N. J., Dec. 23—As a further safeguard to motor bus passengers, the New Jersey Board of Public Utility Commissioners has adopted an order requiring all operators subject to the jurisdiction of the board to equip their buses with emergency doors. Of the 1798 buses in operation, 835 are subject to the board's ruling. The others are subject to regulation by the municipalities exclusively and are not affected. Many of the buses are already equipped with emergency doors.

The order follows:

The Board of Public Utility Commissioners hereby prescribes as a regulation applying to all operators of motor buses subject to the board's jurisdiction that within ninety (90) days from the date hereof each of said buses shall be provided with an emergency door located in the center rear, having a minimum clearance of 18 inches and extending from the floor to the upper belt panel; all emergency doors shall be conspicuously marked "Emergency Door" and so constructed as to be readily opened by passengers in case of emergency; the rear of the bus shall be constructed so that no permanent obstruction will interfere with the passage of passengers through such door, and the rear frame of the bus shall be so designed and constructed as to minimize, as far as possible, rendering the emergency door inoperative in case of accident.

The order is dated Dec. 18.

PLANS AUTOMOBILE BY-PASS

INDIANAPOLIS, Dec. 22—The establishment of new double-width thoroughfares, some of which will be entirely new avenues for short distances, in order to relieve traffic congestion and to give through tourist travel a wide by-pass through the city, is to be recommended to the board of public works by the city planning commission and its traffic expert, J. Rowland Bibbins of Washington, D. C.

Will Tell Railroad's Use of Motor Trucks

New York Central Man to Be at Convention at N. A. C. C. Quarters Jan. 6

NEW YORK, Dec. 23—The use the New York Central Railroad is making of more than 400 motor trucks in 69 different operations between New York City and Chicago will be told by G. C. Woodruff, general freight agent of the road, at the Open Motor Truck Convention to be held at headquarters of the National Automobile Chamber of Commerce on Jan. 6. Mr. Woodruff will speak on the subject, "The Railroads and the Motor Truck," and will also outline his views on the general subject of the coordination of the railroad and the motor truck.

Between 75 and 100 manufacturers are expected to attend the convention, which is sponsored by the N. A. C. C.

"Is Motor Truck Design Backward?" is the subject to be presented at the meeting by B. B. Bachman of the Autocar Co. Mr. Bachman recently returned from Europe, where he studied developments in motor truck design, which have been in the direction of lessened fuel consumption and in lowering of chassis and body weights.

Among the other subjects to be discussed will be "The Future of the Motor Bus" and "How Can the Truck Industry Standardize on Cost Figures?" The names of the speakers will be announced later.

During the meeting a report will be given summing up the results of the New England motor transport conference at Boston the early part of this month, with a discussion to follow as to the value of holding similar conferences in other localities.

Reorganization Group May Buy Duesenberg

INDIANAPOLIS, Dec. 24—The Probate Court has set Dec. 31 as the date to hear the petition filed last week by Receiver William Rasmussen that the plant and assets of the Duesenberg Motors & Automobile Co. be sold. It is understood that at least two reorganization plans and bids will be considered, and that officials of the court and of the company expect that the sale will be to one of the reorganization groups which will carry on the manufacture and sale of the Duesenberg.

Present indications are that the hearing of the petition will bring out active bidding for the company, which seems to have made real progress under the year of receivership. The entire merchandise creditor liabilities are said to be about \$250,000. One group of stockholders cooperating with Fred Duesenberg is said to have made heavy subscriptions for one reorganization plan.

Urges Taxing Cars on Value Basis

Oregon Governor Backs Fight Against Alleged Fictitious Assessment

PORLAND, ORE., Dec. 23—Tax the automobile upon the basis of its value, and not solely upon its weight or a fictitious assessment of its horsepower. This is the plea which is to be made before the coming session of the Oregon Legislature in January.

The plan is the result of an extensive investigation of automobile license fees in this State conducted by a committee named by the Governor to report to the next session. It is strongly urged by Governor Pierce himself, and intended primarily as a measure of relief for the farmer.

It includes the preparation of a sliding schedule of depreciating values, inversely proportional to the age of the car. An actual personal property tax is frowned upon, but the schedule will be presented as a substitution for the license fees, proceeds from which are used primarily for the retirement of State highway construction bonds.

Passage of a "certificate of public necessity" provision in the regulation of automobile stages and bus lines is also proposed.

Oregon at present has a three-cent gasoline tax.

Reo Increases Truck and Export Business

LANSING, Dec. 22—All officers and directors of Reo Motor Car Co. were re-elected at the annual meeting. Reports received at the meeting showed the company to have made steady progress during the year in all departments with greater export and truck business than ever before. The company was shown to have 1528 dealers and distributors, a gain of more than 200 during the year.

Total production during the year was 28,681 vehicles, of which 15,315 were commercial. More sedans are being manufactured now than ever before, it was shown, and there are fewer than half as many new cars in dealers' hands now than at the same time in any other year.

The officers and directors re-elected are: R. E. Olds, chairman of the board; R. H. Scott, president and general manager; H. T. Thomas, vice-president and chief engineer; D. E. Bates, secretary and treasurer.

These, together with R. C. Rueschaw, sales manager; H. C. Teel, factory manager, and G. E. Smith, purchasing manager, compose the board of directors. D. M. Parsons is assistant treasurer.

FORD CHANGES AT ST. PAUL

ST. PAUL, MINN., Dec. 23—A. W. Bendick is to be general superintendent

CONFERENCE TO STUDY DISTRIBUTION COSTS

WASHINGTON, Dec. 23—First steps in the proposed survey of costs of distribution to be undertaken by the Chamber of Commerce of the United States will be taken at a conference scheduled for this city on Jan. 14 and 15. The Chamber has invited 150 business men, economists and representatives of the consuming public to be present.

Manufacturers, wholesalers and retailers will be represented on the business side of the conference, the purpose of which is to study prevailing methods of distribution.

The object of the meeting will be to map out a field of inquiry to be covered in such a survey. It is planned to appoint committees to consider different aspects of the problem and submit reports later to a general meeting of the conference.

of the Ford Motor Co. plant here. He has been assistant superintendent at Highland Park. He announces that three-fourths of the local plant will be utilized for manufacturing and the remainder only for assembly work. Operations will begin March 1 and by the end of 1925 7500 men will be employed. S. A. Stellwagen, manager of the Minneapolis branch, is to be manager in the new plant.

Diamond State Fibre Co. Increases Its Facilities

BRIDGEPORT, PA., Dec. 20—General expansion and some reorganization of its forces has taken place with the Diamond State Fibre Co., manufacturer of celeron silent timing gears, due to increased business. T. Ellwood Webster, identified with the company's operations in Canada, has been appointed general sales manager with headquarters in Bridgeport.

L. T. McClosky, with the title of vice-president in charge of western sales, is in charge of the new warerooms and machine shops established in Chicago. San Francisco Equipment, it is reported, has been doubled to meet the demands of Pacific Coast business and Pittsburgh has been made the headquarters of a new sales territory. The latter office is in charge of G. P. Singer, Jr.

BENDIX OVERSUBSCRIBED

CHICAGO, Dec. 22—Forty thousand shares of the newly organized Bendix Corp. of Chicago, headed by Vincent Bendix, were oversubscribed, by almost 100,000 shares, before the stock went on sale last week on the Chicago Stock Exchange.

Says All Motor Fees Should Go to Roads

A. J. Brosseau at "Roadeo" Dinner Advocates State as Only Vehicle Taxing Body

NEW YORK, Dec. 22—A. J. Brosseau, director of the National Automobile Chamber of Commerce and president of Mack Trucks, Inc., speaking at the annual "Motor Roadeo" dinner held at the Union League Club here under the auspices of the Highways Committee of the N. A. C. C., advocated that all motor vehicle fees should be devoted to highway purposes, and that the State should be the sole motor vehicle taxing body.

"The saving in cost of operation to the motor vehicle user who travels over an improved highway," Mr. Brosseau said, "is more than enough to maintain the highway so that in effect the user who agrees to maintain it reduces his expenses enough when he travels over an improved highway so that it doesn't cost him a cent."

On this basis, he argued, the motor vehicle should pay for all highway maintenance and, in some cases, where it is no undue burden, should also pay part of the construction cost.

"All special taxes on automobile users," he stated, "should be devoted to highway purposes, whether for maintenance, reconstruction, or construction, and expended under the supervision of the State highway department. The State should be the sole taxing agency."

Roy D. Chapin, chairman of the committee and chairman of the Hudson board, presided at the dinner. He told the 100 guests, who included editors, writers and publishers interested in highway questions, that the present year marks the real beginning of motor bus transportation.

Thomas H. MacDonald, chief of the United States Bureau of Public Roads, related the steps that are being taken in Chicago to eliminate the "No-Man's Land" that exists between city and rural traffic.

Roy L. McArdell, columnist, spoke on behalf of the guests.

Receiver Sells Dayton National Motors Plant

DAYTON, OHIO, Dec. 23—The local plant of the National Motors Co. was sold at a receiver's sale here. It was purchased by Will I. Ohmer, former officer and director of the company, for \$250,000. It is stated that other plants of the company will be sold at a later date, in order to pay two mortgages of \$3,000,000 each, and a mechanics' lien of \$40,000.

The other plants of the company are in Louisville, St. Louis, Boston, Buffalo and Saginaw, Mich.

The suit was brought by the Union Trust Co. of Chicago.

Roads Moved to Act by Bus Competition

New York, New Haven & Hartford Fights—Boston & Maine Would Abandon Lines

BOSTON, Dec. 24—Continued steady increase in motor bus transportation in New England is shown by steps taken by two important railroads. One is the action of the New York, New Haven & Hartford Railroad in having counsel appear before the Superior Court at Providence, R. I., with bills of complaint against 20 corporations and persons operating bus lines in Rhode Island. The other is an announcement by the Boston & Maine Railroad of a plan to abandon 1000 miles of railroad to save the system. The New York, New Haven & Hartford Railroad was joined in its legal step in Rhode Island by the United Electric Railways.

Bus Operator Restrained

On petition of counsel for the United Electric Railways Judge Chester W. Barrows at Providence issued a restraining order against Wasyl Fedorowicz, of Crompton, R. I., who operates a motor bus line between Crompton and Phenix, R. I., while on the prayer of the New York, New Haven & Hartford Railroad a restraining order was granted against David Abbot, of East Greenwich, who operates a bus line between Providence and New London, with a stop at Westerly. A hearing on the preliminary injunctions was set for Dec. 29.

In the bills of complaint filed the petitioners alleged that if the buses are allowed to run it will mean a cessation of railroad facilities. A. P. Russell, vice-president of the New Haven road, in a statement stated that the company "proposes to protect the public and its property by aggressive action rather than passive submission."

Buses Hurt Branch Lines

In a plan outlined in a communication Homer Loring, chairman of the executive committee of the Boston & Maine Railroad, proposed that the company undergo a physical and financial readjustment, discontinuing approximately 1000 miles of track and obtaining \$13,000,000 cash for improvements to the lines retained. It was said to follow consultation with bondholders, representatives of the United States government, which holds \$48,000,000 bonds, and large stockholders of all classes.

Mr. Loring stated in his communication that motor traffic has taken such a large part of the always meager traffic on branch lines that rapidly increasing losses have resulted. Of the 2450 miles of road, he said, more than 1000 miles handle only 3 per cent of the business. This it is proposed to abandon, and the Boston & Maine Transportation Co. has been organized for motor service.

MEETINGS LUNCHEONS AND DINNERS SCHEDULED TO BE HELD DURING SHOW WEEKS

NEW YORK, Dec. 24—Events scheduled for New York and Chicago show weeks are as follows:

NEW YORK

Friday, Jan. 2

2.00 p. m.—Opening of show in the Bronx Armory to the trade only.
7.00 p. m.—Banquet of the Bronx Automobile Dealers Association. Concourse Plaza Hotel.

Saturday, Jan. 3

7.00 p. m.—Show opened to the general public.
7.00 p. m.—Banquet for Paige-Jewett dealers. Hotel Commodore.

Monday, Jan. 5

10.00 a. m.—Convention, Motor Trucks under the auspices of the National Automobile Chamber of Commerce. At N. A. C. C. Headquarters.
10.00 a. m.—Second annual show convention of National Automobile Dealers Association. Hotel Commodore.

10.30 a. m.—Meeting of the Rubber Association of America. Hotel Commodore.
12.00 m.—Luncheon for Nash dealers. Hotel Commodore.
12.30 p. m.—Luncheon for Willys-Overland dealers. Hotel Biltmore.
1.00 p. m.—Luncheon for Hupmobile dealers. Hotel Commodore.
7.00 p. m.—Dinner of the Rubber Association of America. Hotel Commodore.
7.00 p. m.—Meeting of the Automotive Electric Association. Hotel Astor.

Tuesday, Jan. 6

10.00 a. m.—Meeting of advertising managers under the auspices of the N. A. C. C. At N. A. C. C. Headquarters.

10.30 a. m.—Mexican Mission. At N. A. C. C. Headquarters.
1.00 p. m.—N. A. C. C. directors' meeting. At N. A. C. C. Headquarters.
1.30 p. m.—Joint meeting of the Metropolitan Section and Empire State Section, Automotive Electric Service Association. Hotel Astor.
2.00 p. m.—Export Trade Day under the joint auspices of the Motor and Accessory Manufacturers Association, Overseas Club of Automotive Boosters International, American Automobile (Overseas Edition) and *El Automovil Americano*. Lecture Room of the Armory.
3.00 p. m.—Meeting of the Traffic Planning and Safety Committee. At N. A. C. C. Headquarters.
6.30 p. m.—Annual Banquet of the N. A. C. C. Hotel Commodore.
7.00 p. m.—Automotive Electrical Banquet. Hotel Astor.

Wednesday, Jan. 7

10.00 a. m.—All-day Oldsmobile dealers' meeting. Hotel Commodore. To 6 p. m.
10.30 p. m.—Mexican Mission. At N. A. C. C. Headquarters.
1.00 p. m.—Luncheon for Franklin dealers. Hotel Commodore.
1.00 p. m.—Luncheon for Oakland dealers. Hotel Commodore.
2.00 p. m.—Annual Meeting of the Motor and Accessory Manufacturers Association. Hotel Astor.

6.00 p. m.—Banquet for Oldsmobile dealers. Hotel Commodore.
7.00 p. m.—Banquet of the Motor and Accessory Manufacturers Association. Hotel Astor.
7.00 p. m.—Banquet for Studebaker dealers. Hotel Plaza.
7.30 p. m.—Cadillac Old Guard Dinner.

Thursday, Jan. 8

10.00 a. m.—Council Meeting of the Society of Automotive Engineers. Engineering Societies' Building.
12.30 p. m.—Luncheon to Buick National Distributors and Branch Managers. Hotel Commodore.
6.30 p. m.—Annual Dinner of the S. A. E. Hotel Astor.
1.00 p. m.—Luncheon for Rickenbacker dealers. Hotel Commodore.

CHICAGO

Thursday, Jan. 22

Salesmen's Banquet under the auspices of the Chicago Automobile Trade Association, Congress Hotel.

Friday, Jan. 23

Opening of the show at 2 p. m. in the Coliseum to the trade only.
Sales convention for Paige-Jewett dealers, Blackstone Hotel.

Saturday, Jan. 24

Opening of the show at 7 p. m. to the general public.
Sales convention and banquet for Paige-Jewett dealers, Blackstone Hotel.

Tuesday, Jan. 27

Meeting of the Board of Governors of the Automotive Electric Service Association. Congress Hotel.

Banquet for Hupmobile dealers. Blackstone Hotel.

Eighth Annual Convention of the National Automobile Dealers Association. La Salle Hotel. (Also Jan. 27, 28 and 29)

Wednesday, Jan. 28

Convention of the Automotive Electric Service Association. Congress Hotel. (Also Jan. 28.)

Joint Dinner of the Briggs-Stratton Co. and Automotive Electric Service Association. Florentine Room, Congress Hotel.

Thursday, Jan. 29

Banquet for Old Timers. Florentine Room, Congress Hotel, 7 p. m.
Luncheon for Oakland dealers. Blackstone Hotel.

Friday, Jan. 30

Banquet for Studebaker dealers. Blackstone Hotel.

Texas Plans Revision of Automotive Taxes

Owner Likely to Pay Less on His Vehicle, But More on His Gasoline

DALLAS, TEX., Dec. 24—Automobile tax laws of Texas are destined to undergo a revision. The automobile owner is going to pay less on his vehicle, but the tax on gasoline is going to be increased.

These policies have practically been decided upon by the automobile dealers and Miriam A. Ferguson, the governor-elect. The tax on automobiles probably will be reduced some \$6 per car.

Automobiles used for bus lines very likely will be put under the supervision of the Texas railroad commission. A tax may be levied upon the gross receipts of bus line operators in addition to the usual motor vehicle tax.

In the long run the automobile owner will have to pay the additional gasoline tax. The tax may be increased from 1 cent to 3 cents per gallon and the refineries may be required to pay it. Of course they will pass it on to the automobile owners.

In Texas gasoline is used for more purposes than operating automobiles, and the increased tax on gasoline will more than offset the reduction in the levy on automobiles, it is said. Mrs. Ferguson will see that some of the automobile and gasoline taxes are passed to the maintenance of the public schools.

In Texas it is estimated that the average amount of gasoline consumed per car is 500 gallons per year. There are about 800,000 motor vehicles. This would make the gasoline consumption for motor vehicles 400,000,000 gallons and the tax on this would amount to something like \$12,000,000.

Apperson Adds to Its List Eight-in-Line Model

KOKOMO, IND., Dec. 24—A "Straight-Away Eight," or, in other words, an eight-in-line model, has been added to the line of the Apperson Automobile Co., which now comprises the Super-value Six, the Custombilt V-8 and Straight-Away Eight. The new model has an engine with 3 1/2 by 4 1/2 in. cylinders, making the displacement 276 cu. in. and the N. A. C. C. rating 31.25 hp. The cylinders are of the L-head type.

Like the other two models of the line, the Straight-Away Eight will be equipped with mechanical gearshift and dashboard emergency brakes, leaving the front compartment free of obstructing levers. Four body styles are offered on the new eight cylinder chassis, viz., a sport phaeton at \$2,550, a coupe at \$2,800, a four-door brougham at \$2,800 and a sedan at \$2,850.

It is expected that the four-door brougham will be the most popular of the straight eight types. The body of

this type is designed for four or five passengers and is claimed to combine the luxury and roominess of the sedan with the short-coupled, easy riding qualities of the coupe.

In all of the new models chipmunk brown mohair and Spanish leather upholstery are optional, and a choice of several color combinations is given.

Prices on the six-cylinder models have been increased and are now as follows: Sport-phaeton, \$1,850; coupe, \$2,350; sport-sedan, \$2,395. On the V-8 line prices remain the same.

Auburn Brings Out Sedan to Sell at \$1,595

AUBURN, IND., Dec. 20—A new Auburn low priced sedan on the six-cylinder chassis is now in process of delivery to dealers. The equipment on this model includes four-wheel brakes, balloon tires, disk wheels, snubbers, front bumper, spare tire with cover, Moto-Meter with bar cap, cowl lamps, cowl ventilator, gasoline gage on the dash, automatic wind shield wiper, rear vision mirror, heater, dome light, kick plates and combination stop and tail lamp.

The price is \$1,595, the lowest priced closed car ever put out by this company. The body for four doors and the upholstering is in wool broadcloth.

Cleveland Coach Premier Brought Out at \$1,295

CLEVELAND, Dec. 24—A Coach Premier has been added to the Cleveland line. It sells for \$1,295, said to be the lowest price of any closed Cleveland car ever brought out. The body is by Fisher and is finished in Bloomfield gray and black Duco finish. All contours are achieved by pleasing curves, instead of angular corners. The doors are 35 in. wide, affording easy passage to and from the rear compartment.

The rear seat is unusually wide, and there is good leg room. The windshield is the Fisher VV, and the upholstery is taupe gray worsted. The hardware is in matte silver.

The equipment includes the automatic dash controlled windshield wiper that is part of the VV windshield, leather-covered sun visor, cowl lamps, dome lamp and full width foot rail.

Holslag Upheld in Claim to Arc Welding Invention

NEWARK, N. J., Dec. 24—The Circuit Court of Appeals of the District of Columbia has rendered a decision sustaining the concurrent decisions of all tribunals of the United States Patent Office in awarding to Claude J. Holslag priority of invention over Charles B. Waters on the subject of alternating current arc welding transformers. These inventions are described in Holslag patents 1305, 360-1-2-3.

Owner of the patent rights until June 3, 1936, is the Electric Arc Cutting & Welding Co. of this city.

Physical Test Law Opposed in Chicago

Automobile Trade Association Pronounces "Competency Act" Unnecessary

CHICAGO, Dec. 23—Resolutions have been adopted by the Chicago Automobile Trade Association in which this organization voices its opposition to the so-called Competency Act, which would require all automobile drivers in Illinois to pass a physical examination on their fitness to operate motor cars.

According to the position of the association, such a law would necessitate the appointment of a large number of examiners throughout the State and the creation of a large and expensive organization for the examination at an annual expense of \$2,000,000 to \$4,000,000. If efficiently and honestly conducted, it is pointed out, the examination of so large a number of persons would require many months each year before licenses could be issued.

It is held that this would mean that a large number of owners of automobiles would be deprived of the use of their cars for many weeks or months, due to the slow operation of the tests.

It is further contended that if the examinations were not carefully and honestly made, so as to hurry the work through, the law would be a farce and serve only as a political vehicle with influence or political pull as the qualifying factor of competency to drive.

The association lets it be known that it is in complete harmony with all efforts to minimize reckless driving.

Flat Price Policy Adopted by Stutz

INDIANAPOLIS, Dec. 24—Stutz Motor Car Co., which will exhibit two new body styles at the New York Show—a four-passenger coupe and a five-passenger sedan—will exhibit sixes exclusively. The new types present a four-passenger coupe and a sedan in which the new speedway six engine is mounted.

These new body styles are priced at \$3,580. All Stutz prices are now delivery prices. Extras for government tax and for freight from factory have been eliminated from list prices for all territories east of the Rockies, at least. Flat Pacific Coast prices also will be announced later. This flat price policy with the advertised list price as the delivery price for all parts of the country, with the noted exception, is one of the important innovations of the Stutz show plans.

Another novel feature of the Stutz exhibit will be the display of two cars finished in the new patented Robbins Polychrome process, which gives a subdued mottled effect in harmonious color lines. Stutz is the only company which will show cars of this style of finish.

Men of the Industry and What They Are Doing

Altrea Succeeds Broadwell

E. H. Broadwell, vice-president of the Fisk Rubber Co., has resigned as a director of the Motor and Accessory Manufacturers Association, due to the pressure of other business, and is succeeded by A. H. D. Altrea, vice-president of the American Bosch Corp. Mr. Broadwell has been a director of the association for a number of years and was its president in 1922 and 1923.

Hall Retires from Bethlehem

H. B. Hall, who organized the Bethlehem Motors Corp. two and one-half years ago, has retired as president and general manager of the company.

Bremer Joins Chain Company

Fred G. Bremer, branch manager of the Biflex Corp. at Detroit, has become associated with the bumper division of the United States Chain & Forging Co., Pittsburgh, manufacturer of McKay bumpers, effective Jan. 1.

Rose Goes with Fageol Motors

Charles B. Rose, for 16 years with the Velie Motor Co. in Moline, Ill., as chief engineer and vice-president and later in charge of the tractor plant of the Moline Plow Co. when the John N. Willys control took place, has taken up his duties as vice-president and general manager of the Fageol Motors Co. of Kent, Ohio.

Bostwick Re-enters Publicity Field

O. M. Bostwick, New York representative of the publicity department of the General Electric Co. and formerly advertising manager of the Sprague Electric Works, has resigned, effective Jan. 1. After a short vacation, Mr. Bostwick plans to resume his activities in the technical publicity field in New York.

Bryant Goes to Meyer-Kiser

George T. Bryant has been appointed general manager of sales for the Meyer-Kiser Corp., Indianapolis. He was formerly director of sales for Robert H. Hassler, Inc. The Meyer-Kiser company is one of the pioneer automobile financing organizations in the country, with its activities extending over a large part of the United States.

Turner Promoted by Westinghouse

Allen D. Turner, formerly in charge of automotive publicity and advertising, has been appointed manager of the publicity division of the Boston Office of the Westinghouse Electric & Manufacturing Co. Mr. Turner entered the employ of the company in April of 1922 and for a year was in charge of exhibition and convention work. In April, 1923, he was placed in charge of automotive advertising and publicity with headquarters at Springfield, Mass.

SEES CAR OF FUTURE AS SMALL AS A DESK

INDIANAPOLIS, Dec. 23—The car of the future will be no larger than an office desk and will get 50 miles of transportation from one gallon of gasoline, Edward S. Jordan, president of the Jordan Motor Car Co., told members of the Lions Club during a luncheon here.

Mr. Jordan predicted that 1925 will be a banner automobile year, basing his conclusions on observation and study of conditions in many parts of the country.

He also sounded a warning against over-production on the part of manufacturers during the next twelve months.

Merrick Goes to East Pittsburgh

F. A. Merrick, vice-president and general manager of the Canadian Westinghouse Co. of Hamilton, Ont., has been elected vice-president and general manager of the Westinghouse Electric & Manufacturing Co., and will be located at East Pittsburgh, Pa. E. M. Herr, president of the Westinghouse company, will transfer his offices from East Pittsburgh to New York.

Myers on European Trip

T. E. Myers, general manager of the Indianapolis Motor Speedway Co., has gone to Europe to enlist entries of foreign racing drivers in the thirteenth international 500-mile automobile race to be held here next Memorial Day.

Service Managers Dined by Milwaukee S. A. E.

MILWAUKEE, Dec. 22—A departure in relations between engineers and service managers was marked by the action of the Milwaukee section of the Society of Automobile Engineers in devoting its monthly dinner meeting to entertaining the recently organized Milwaukee Maintenance Managers' Association and the Automotive Electrical Association of Milwaukee for a discussion of mutual problems.

U. T. HUNGERFORD DINED

NEW YORK, Dec. 22.—The stockholders of the U. T. Hungerford Brass & Copper Co., together with a few invited guests, tendered a luncheon at the Hardware Club in this city this week to Uri T. Hungerford, chairman of the board of directors and founder of the company, on the occasion of his 83d birthday.

Favor Weight Basis for License Law

Automobile Makers and State Officials Indorse Proposed Michigan Changes

DETROIT, Dec. 22—Proposed changes in the Michigan license law whereby the fees would be fixed entirely on a weight basis, and the horsepower rating eliminated, have been indorsed in a letter to the Secretary of State from a committee of automobile manufacturers and officers of the State and Detroit dealer associations. The committee further declares that it is not opposed to a gas tax, provided the revenue is used to reduce the license fee.

In taking this stand the committee declares that it is unreservedly for the continuance of the State highway program as outlined by State officials and insists that no interference with this be tolerated.

Members of the committee are Arthur T. Waterfall, vice-president of Dodge Brothers, Inc.; Alvan Macauley, president Packard Motor Car Co.; C. S. Mott, vice-president General Motors Corp.; H. H. Rice, president Cadillac Motor Car Co., representing manufacturers, and W. P. Staebler, president of the Michigan Automotive Trade Association, and A. L. McCormick, president of the Detroit Automobile Dealers Association, representing dealers.

All money derived from license fees and gas tax should be used for no other purpose than highway building and maintenance, the committee declares. The State would have available about \$10,000,000 for its yearly building program which the committee feels is more than justifiable and in fact imperative.

In stating its favor of a change to a fee based entirely on weight, the committee declares its belief that trucks should be required to pay more per hundred-weight than passenger cars.

The committee calls attention to the fact that small cars are now paying at the rate of 70 cents per cwt. and if all motor vehicles in the State were made to pay on the same basis not more than 40 per cent would pay more than at the present time.

DETROIT EMPLOYMENT 199,183

DETROIT, Dec. 23—Industrial employment here last week increased 1986, against 122 the week before, bringing the total to 199,183, as compared with 219,990 for the corresponding week last year. Employment here has shown weekly increases since Nov. 8, the total gain being 5158.

Seek to Standardize Important Parts

Spark Plugs, Brake Linings and Piston Rings Discussed in Washington

WASHINGTON, Dec. 23—The preliminary step for standardization in the automobile industry of its use of spark plugs, brake linings and piston rings was taken up here when representatives from the industry met with the division of simplified practice of the Department of Commerce.

Meeting with the department and the automobile manufacturers were also representatives from the Society of Automotive Engineers, the National Automobile Chamber of Commerce, Automotive Equipment Association and other associations allied with the automotive trade.

After two days' discussion on the ways and means of accomplishing standardization and simplification it was finally decided that the Society of Automotive Engineers should be authorized to make a thorough study of the possibilities of standardization of brake linings, spark plugs and piston rings, and that a meeting would be called at a date to be announced later, when the findings of the society could be taken up for action by the manufacturers.

Two Phases of Simplification

Discussion brought out that there are two phases entering into simplification of these commodities, one the demand for new car construction, which was declared to be relatively simple, and the other the demand for service and replacements on cars which have been on the road for some time. The first phase of this simplification, it was declared, can be solved only by the action of automotive engineers and designers, while the second must take cognizance of the number of "orphan" or obsolete cars now on the market, the changing trend of motor design, the growth of truck and bus transportation and the effect of wear and tear.

In order that the conference might have something specific to work on, a report on the brake lining simplification problem was made by R. S. Burnett of the Society of Automotive Engineers and F. C. Stanley of the Asbestos Brake Lining Association. This report disclosed that there are now manufactured more than 100 sizes, as to width and thickness, of brake linings. Opinion was expressed that 28 sizes would meet the demand.

Figures submitted showed that last year a total of 51,000,000 ft. of brake lining was sold, of which 7,800,000 ft. was manufactured and sold for miscellaneous combinations, while of 24 sizes 60 per cent of the sales were in five combinations of width and thickness.

Problems of the spark plug manufacturers were divided, as in the case of the brake lining group, into new construc-

tion and replacements. Here, however, a further complexity was added by the development of aviation, motorcycles, motor buses and racing types of automobiles, as well as the changing design of motors and the need of providing for air-cooled and water-cooled motors by different types of spark plugs. It was voted by the conference to refer to the S. A. E. the question of developing standards for the clearance space for spark plugs, as well as terminal connections.

Committee to Consult Designers

A committee will be appointed by the society to take up with engine designers and manufacturers the necessity for changes which will be of advantage to users, as well as the parts industry.

On the question of piston ring standardization it was developed that there are now 4800 sizes and that 100 sizes and varieties would cover all necessary needs for new car construction. This phase of the simplification program will also be worked out by the S. A. E. for future ratification by the conference.

It was declared, however, that any changes affecting new designs of rings will take several years to initiate.

Automobile Excise Tax Leads All Others

WASHINGTON, Dec. 23—Collection of automotive excise taxes from the automobile industry during November aggregated \$6,400,113, representing a decrease of \$6,796,809 under the tax collected in November, 1923. It is approximately a reduction of 51 per cent.

Figures compiled by the internal revenue bureau show that the total tax collected the first 11 months of this year from the automobile industry aggregates \$49,599,676, compared with \$66,140,327 the first 11 months of 1923—a reduction amounting to \$16,540,650.27.

The automobile industry paid to the federal treasury almost double that of any other industry in manufacturers' excise taxes in November of last year, while the November payment this year shows that corporation taxes, on value of capital stock, amounting to \$16,887,863, led the list, the automobile industry being second with its \$6,400,000 payment.

Comparing the November tax this year with November of last, the excise figures show the following payments:

	Nov., 1923	Nov., 1924
Automobile trucks and automobile wagons.....	\$789,284	\$521,711
Other automobiles and motorcycles	9,543,000	4,481,584
Parts and accessories.....	2,864,636	1,396,817

MOTO-METER MAILS BY AIR

NEW YORK, Dec. 24—The Moto-Meter Co., through official action of its directors, has adopted the policy of sending one quarter of all its Western mail by air mail service. This has been done to expedite delivery of mail and to encourage the development of federal aviation.

FINANCIAL NOTES

Ford Motor Co., investment certificates, which are available only to employees of the company, will pay a return of 14 per cent for the year 1924. The guaranteed annual rate of interest on the certificates is 6 per cent. Special returns in both the first six months period and in the second period increased the interest rate 8 per cent, making the total for the year 14 per cent. Payment of interest will be made immediately after Jan. 1 and employees who are investors in the certificates will receive interest due them in connection with the payment of wages.

Briggs Manufacturing Co. stock to the amount of 400,000 shares, within par value, has been offered at \$30 a share, to yield 8.90 per cent by a syndicate headed by Merrill, Lynch & Co., Hallgarten & Co., Hornblower & Weeks, J. & W. Seligman & Co. and Dominick & Dominick. This is the first public offering of the stock ever made, the block having been purchased from individuals and involving no new financing. Directors plan to inaugurate quarterly dividends on the stock at the rate of \$3.50 per annum, commencing in January, 1925, it is stated.

Sayers & Scovill Co. has declared an extra dividend of 1 per cent and the regular quarterly dividend of 1½ per cent on the common stock, payable Jan. 1 to holders of record Dec. 26. On Oct. 1, 1924, the company paid an extra dividend of 5 per cent on the common.

Goodyear Tire & Rubber Co. directors have declared the current quarterly dividend of 1¼ per cent and one deferred quarterly dividend of 1¾ per cent on the preferred stock, payable Jan. 2 to holders of record Dec. 20.

Dunlop Rubber Co., Ltd., has announced the posting of checks for £760,000, arrears on the preference dividends, up to Dec. 31, 1923.

Skoda Works to Make Hispano-Suiza Cars

WASHINGTON, Dec. 15—Advices to the Department of Commerce from its commercial attache at Prague state that the Skoda Works at Pilsen, Czechoslovakia, has obtained a license from the Hispano-Suiza Co. in France to manufacture automobiles of that type. They also say that steps are being taken to start manufacturing immediately so that the Czech car may be on the market in 1925.

It is understood that the agreement with the French firm gives the Skoda works the exclusive sales rights, not only in Czechoslovakia, but in most of the countries in central Europe, including Poland, Austria, Hungary, Yugoslavia, Rumania and Bulgaria.

Some months ago the Skoda works acquired a manufacturing license from the English owners of the Sentinel steam motor truck and has undertaken its production. It is also understood that Skoda has acquired the manufacturing license from the British firm for manufacturing electric automobiles under the Tilling-Stevens patents.

Construction of a small two-cylinder automobile is in progress at the small arms plant in Brno, belonging to the Czechoslovakian government. A number of experimental cars have been turned out and it is expected that production on a commercial basis can be started in order to put the cars on the market for next year's selling season.

Cotton Crop Helps Sales in Southeast

Trade Conditions Improve with Outlook for 1925 Regarded as Good

ATLANTA, GA., Nov. 22—Automotive sales conditions in the southeastern section of the country appear to have been improving the last two or three weeks, with a fair demand reported for closed cars, but as a whole, larger distributors state that the volume of business is still running somewhat below that of the corresponding period last season, with the exception of Ford sales, which are showing a very good improvement.

Buick and Studebaker sales also appear a little better than last season at this time, at least in the larger cities, although smaller dealers are experiencing a slight decline.

The outlook is regarded by distributors as very good for the early part of 1925, due to the large cotton crop produced and the fact that prices are holding to a good price level around 23 cents per pound. The year's crop exceeded 13,000,000 bales, about 3,000,000 bales larger than 1923, 3,500,000 bales larger than 1922 and more than 5,000,000 bales larger than 1921.

Selling at good prices, the large crop has materially increased the purchasing power of the agricultural industry in the South. Practically all lines of business in the district are beginning to experience the favorable results of this increase, and will continue to do so for some months.

Tractor Sales Increase

ATLANTA, GA., Dec. 23—A gain of more than 25 per cent in tractor and power farming equipment sales in the southeast section of the country during October and November, as compared with the same period last year, is shown in a report of the seven larger distributing firms having headquarters in Atlanta, according to a statement by the Federal Reserve Bank for the Sixth district.

This is one of the best gains in some months, and portends an indefinite period of good business due to the profits realized from the unusually large cotton crop produced this year in the South.

Tractor and implement distributors are more optimistic over the outlook than they have been in more than a year, and are looking for the first quarter of 1925 to prove one of the most active selling periods in the history of the power farming industry in the South.

Indiana Seeks Costly Cars

INDIANAPOLIS, Dec. 22—Sale of cars for Indiana for November reached a level lower than established during November, 1923, but the real sales were undoubtedly higher than the registration figures indicate, as new 1925 license plates were obtainable starting

Dec. 15 and many cars bought during November were not entered until a few days ago. As a result, the December figures are expected to be higher than actual sales for the month would bring.

It is noted that with a State sale of new cars and trucks for November placed at 3319, the registration from Indianapolis and Marion county was 588, a slightly better average than the city has been doing relative to the entire State monthly sale.

Reports from a number of important distributors show that December sales in their lines are better than they were last year. New models of higher priced cars seem to be moving more rapidly than the low class lines.

INDUSTRIAL NOTES

Houk Rubber Co. stockholders have authorized the directors to negotiate the lease and equipment of the Monoblock Co. of Dover, Ohio. It is understood that a considerable sum of money will be spent immediately in equipment for the plant, which was formerly owned by the Tuscora Rubber Co., and that sufficient capital is available for operations, which, it is said, will be on an extensive scale.

Flint Motor Co. has completed its new administrative building at Flint, Mich. In this the executive departments of the company will be located from this time on and the entire factory space made available for manufacturing purposes. The building has a frontage of 218 ft. and is three stories high.

Swartwout Co., industrial oven engineer and manufacturer, Cleveland, has appointed Joseph J. Beeman, 14559 Hubbell Avenue, Detroit, to cover the Detroit territory and the Industrial Equipment Co., Jackson Building, Buffalo, to cover the Buffalo territory.

Purox Co., manufacturer of welding and cutting apparatus and supplies, is completing two acetylene plants, one at Los Angeles and the other at Oakland, Cal., to supply its customers on the Pacific Coast with acetylene.

Ford to Develop New Site for Water Power

DETROIT, Dec. 23—Ford Motor Co. will add to its hydroelectric plants by the development of a waterpower site on the Huron River, near Ypsilanti, which will be equipped with two turbo generators with a combined capacity of 700 hp.

The new site will be the second Ford hydroelectric development on the Huron (the Flat Rock plant being ten miles further south); the fifth in the Detroit district, and the ninth in the United States. With the new plant the company will have a total generator equipment rating of 51,740 hp.

According to company estimate, the operation of its hydroelectric stations permits a saving of approximately 113,310 tons of coal a year.

STUDEBAKER CHANGES FINISH

SOUTH BEND, IND., Dec. 23—Studebaker Corp. announces that beginning Jan. 1 all its models with the exception of the Standard-Six duplex will be done in Lacqueroid, with permanent satiny finish.

METAL MARKETS

While the iron and steel markets are as firm as they can be without prices mounting, all of the material now being shipped and billed was bought at the low prices that prevailed up to the market's recent change of front. Even during the major part of the recent buying movement, eleventh-hour buyers were enabled to place their contracts at these old prices.

It is said that two out of every three tons of steel which the independents will ship during the new year's first quarter will be billed at these old prices, the leading interest being in much more favorable position than the independents in this respect. The U. S. Steel Corp.'s low price obligations are reported to be just half that of the independents.

The consumers of the heavier rolled steel products are better protected by forward orders at low prices than the general run of automotive steel users, who, on the whole, have not deviated to any considerable extent from their hand-to-mouth buying policy.

In a measure, it is believed in the market, the low prices at which considerable steel will pass into consumption during the new year's first quarter will act as a restraining influence upon too sharp advances in that period. It is quite possible, though, that the excellent results in the way of orders brought out when the market strengthened recently and higher prices were forecast, may bring back into vogue a greater amount of forward buying by astute buyers who will seek to cover their future needs whenever they believe the market is due to rise.

A disconcerting feature already creeping into the situation is the advance by the independent coke producers of the Connellville region of their wage scales by about 30 per cent. This advance, while designed to equalize the wage scales of the independents and the leading interest, adds approximately \$1 to the cost of each ton of pig iron. It may be the opening wedge to a resumption of the vicious circle by which prices are swollen permanently as the result of higher labor costs.

While the steel industry's prosperity during the new year's first three months is a fairly assured fact, it will depend entirely upon the rate of steel consumption in that period and the demand that will develop in that time, how the steel makers will fare during the year's remainder.

March will be the crucial month. Sheet bars have advanced to \$40.

Pig Iron—Quite a few producers are quoting prices which clearly indicate that they are not anxious for business at this time. Higher coke prices resulting in higher production costs are expected to lift values considerably higher early in the new year.

Aluminum.—The market remains unchanged so far as concerns the supply for which it is utterly dependent upon the domestic producer. Price advances are looked for. German aluminum producers have gone in energetically for broader home markets and have begun a campaign to popularize aluminum and magnesium alloys in place of the heavier metals. Berlin reports state that the automotive industry's purchase of aluminum is continually increasing.

Copper.—Domestic consumers continued to inquire for copper in spite of further fractional advances. Prices for copper and brass products have been readjusted on the higher basis of cost of the red metal.

1000 More Men Return to Work in Toledo

TOLEDO, Dec. 22.—Toledo automotive plants have been largely responsible for a rapid gain in employment in local plants.

In two weeks more than 1000 employees have been taken back to work and about 7000 have gone on full time.

Total at work in 51 plants covered by a weekly census shows 19,741 for the second week in December. This is compared with 25,884 in the same plants a year ago.

Willys-Overland Co. is getting into production.

Calendar

SHOWS

- Jan.** 2-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory. Open to the public except on Jan. 2 and 3 which are trade days.
- Jan.** 17-24—Cleveland, Annual Automobile Show.
- Jan.** 23-31—Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory. Open to the public except on Jan. 23 and 24 which are trade days.
- Jan.** 25-31—Chicago Annual Automobile Salon.
- Feb.** 7-14—Kansas City, Mo., Annual Automobile Show.
- Feb.** 21-28—San Francisco, Pacific Annual Automobile Show.
- March** 7-14—Boston, Twenty-third Annual Automobile Show.

March 8-14—Vienna, Spring Fair.

March 20-29—Geneva, Switzerland, Second Swiss International Motor Exhibition.

April 1-17—Sydney, Australia, Royal Agricultural Show. Embraces automobile exhibits.

April 22-May 7—Melbourne, Australia, International Automobile Show, under the auspices of the Chamber of Automotive Industries, in conjunction with the Royal Automobile Club of Victoria.

June—Rio de Janeiro, Brazil. Rio Automobile Show, originally scheduled for October, 1924, but postponed for more extensive arrangements.

RACES

July 26—Paris, Monthly Track, French Grand Prix.

CONVENTIONS

Jan. 5—New York, Convention under the auspices of the

National Automobile Dealers Association, Hotel Commodore.

Jan. 5-9—Chicago, Road Show and Convention of the American Road Builders Association.

Jan. 26-29—Chicago, Eighth Annual Convention of the National Automobile Dealers Association, Hotel LaSalle.

June 22-27—Summer convention of the Automotive Equipment Association at the Broadmoor Hotel, Colorado Springs, Colo.

S. A. E. MEETINGS

Dec. 15—Cleveland Section, Development of Clutches, Ernest C. Wemp, Long Manufacturing Co., Old Colony Club, Hotel Cleveland.

Dec. 18—Metropolitan Section, Multiple Wheeled Vehicles, A. W. S. Herrington and A. F. Masury, Hotel Empire, New York City.

Jan. 15—Indiana Section, Lubrication and Crank Case

Dilution, S. W. Sparrow of the U. S. Bureau of Standards.

Jan. 19—Cleveland Section, Preparation of Fuel Charges and Detonation, Arthur H. Denison, Weger Motor Co., Old Colony Club, Hotel Cleveland.

Jan. 20-23—S. A. E. Annual Meeting, Detroit.

Feb.—Indiana Section, Automobile Finishes.

Feb. 16—Cleveland Section, Electrical Instruments and Measuring of Chassis Tests by Means of Them, J. H. Hunt, General Motors Research Corp., Old Colony Club, Cleveland.

Mar.—Indiana Section Developments in Transmission.

Mar. 16—Cleveland Section, Road and Riding Ability, Harry Horning, Waukesha Motor Co., Old Colony Club, Hotel Cleveland.

Apr. 9—Indiana Section, Talk by F. E. Hunt, head of electrical division, General Motors Research Corp.

Survey Shows Tire Industry as Busy

WASHINGTON, Dec. 22—Curtailed production in the automobile and accessory industries is reported from practically all centers of these industries in the December industrial employment survey just made by the U. S. Employment service of the Department of Labor.

This curtailment ranges from four and six hours working time in some automobile manufacturing plants to half time in some of the plants in Detroit. For the tire industry the telegraphic reports show that the curtailment is slight, while many manufacturing plants are working on an overtime basis.

The summary of the survey, as it affects the automobile industry, is as follows:

Detroit—A surplus of common labor is reported throughout the State, due largely to the curtailment in road-building operations. Two large automobile plants here are working part-time on a three, four or five-day a week basis, affecting 50,000 men.

Flint—There is a surplus of labor here, mainly automobile factory workers. Most plants are operating on part-time schedules and a large wheel plant is closed down indefinitely, affecting 600 workers.

Lansing—Automobile plants and those manufacturing automobile parts are working on part-time schedules, producing a surplus of this class of help.

Jackson—Three of the larger automobile accessory plants are running a 40 to 44-hour week in place of 48 to 54; about 2,500 workers are affected.

Ohio to Be Busy Next Year

Ohio as a whole reports the automobile industry operating considerably below normal, also a slight let-down in rubber tire manufacturing plants. "But this is very small, and a full production will be resumed after Jan. 1," the reports state.

Cincinnati—One automobile company closed from Nov. 1 to Dec. 1, making prep-

arations to begin the manufacture of a 1925 model.

Akron—There has been a slight seasonal slackening noted in the rubber industry, although employment is better at this time than it has been for a number of years. The outlook continues favorable, and an increase in activities is looked for about the first of the year.

Mansfield—Rubber-tire companies are operating overtime and expect to continue on this basis indefinitely.

Reports from Other Districts

Reports from other districts are as follows.

St. Louis—Slight seasonal reduction noted in automobile plants, and iron and steel industries.

Indianapolis—One of the largest automobile plants is closed down, affecting many workers.

La Porte (Ind.)—A tire and rubber company here continues to work on an overtime basis.

Muncie (Ind.)—Automobile and automobile accessory plants are working on part-time schedules, which, together with the let-up in building activities, has created a surplus of common labor.

Coast Oil Men Oppose Greater Gasoline Tax

SAN FRANCISCO, Dec. 20—Oil producers and distributors of California have decided to make an aggressive fight against a further increase of State taxes on gasoline as a result of an informal conference held here of leading oil producers of the State.

The oil men say that the tax burden is being borne by them now without any great complaint, but the moment the price begins to rise, which the members of the conference say it will within a few years, there is certain to be a great outcry and the oil companies will be assailed.

They claim that there is a tendency in virtually all of the States to look to a gasoline levy as a means of raising additional revenue.

Automotive Industry Pronounced Stable

WASHINGTON, Dec. 20—Stability in the automobile industry throughout the fall is shown in the survey for December by the Federal Reserve Board. Employment in the industry, the board finds, "is about one-sixth less than in November, 1923, but corresponds rather closely to the level of two years ago."

In commenting on the wind-up of the present year in the automobile industry the board says:

Steadiness Throughout Fall

One of the features of the automobile industry has been the fact that activity throughout the fall has been stable. Production has increased considerably since the low point reached last June, but output of passenger cars is still well below that of this time last year. The number of cars produced has changed little in the past three months. Trucks seem to be in a relatively better position than passenger cars, as truck production has increased slightly each month during the last quarter, and exceeds the corresponding months of last year.

About 32,500 freight carloads of automobiles were shipped during October, an increase as compared with September, but much less than a year ago. Statistics of direct shipments from factory to dealers in October show a small decline from September and a very sharp drop since last October. Sales by dealers to consumers followed somewhat similar trends. Sales reported by middle western wholesale dealers to the Chicago Federal Reserve Bank were somewhat larger than a year ago, but retail sales were smaller. For the first time in over a year stocks held by dealers were reported to be smaller than a year earlier.

Developments in the automobile tire industry have been rather significant in recent months. Shipments had a remarkable increase in July and August, exceeding all previous records, and production started upward in the latter month. In the meantime stocks were reduced considerably until this autumn, when shipments declined and production increased.

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Vol. 51

No. 26

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Contents

National View of Traffic Safety Needed, Hoover Meeting Shows. By Norman G. Shidle	1073
Schaeft Enters Bus Field with Low Hung Chassis Having Ten-Speed Gearset	1078
Accessibility with Complete Enclosure Com- bined in New Wisconsin Engine.....	1080
1925 Metal Market Outlook Does Not Just- ify Lower Car Prices. By W. C. Hirsch.	1082
Tests Show Breakdown Pressure of Oil Films in Babbitt Bearings.....	1084
Tells How Pressure Lubricating Systems Can Be Improved. By Neil MacCoul.	1086
Just Among Ourselves	1089
Extension of Time Sales Abroad Increasing Export Sales of Cars and Trucks.....	1090
Here and There in Foreign Markets	1092
Bigger Loads on Multi-Wheeled Vehicles Urged to Relieve Congestion and Preserve Roads	1093
Enclosed Electric Drive and Friction Clutch Features of New Milling Machine.....	1095
Advertising and Increased Sales.....	1097
Editorial	1099
News of the Automotive Industry—	
Creditors Get Assets of Standard Parts....	1102
Moskovics Awarded \$158 as Damages.....	1103
Roads Move to Act by Bus Competition.....	1107
Meetings, Luncheons and Dinners Scheduled During Show Weeks.....	1107
Says All Motor Fees Should Go to Roads.....	1106
Seek to Standardize Important Parts.....	1110
Cotton Crop Helps Sales in Southeast.....	1111
Financial Notes	1110
Industrial Notes	1111
Metal Markets	1111
Calendar	1112
Contract Work and Classified Advertising..	95
Index to Advertisers	96-97

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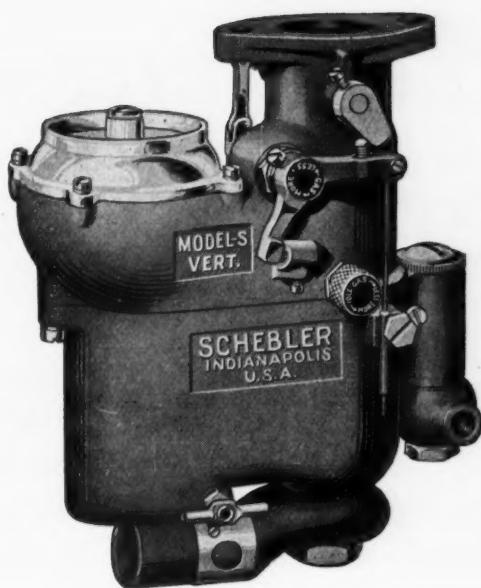
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The units manufactured will be the Bendix 3-Shoe Self-Energizing Servo Brake,* and the Bendix-Perrot Control;* fully standardized for easy, economical application to cars of every class.

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Careful balancing of reciprocating parts, to hair's-weight limits, keeps a Wisconsin Motor smooth-running and quiet long after a "production motor" becomes a rattle-trap.

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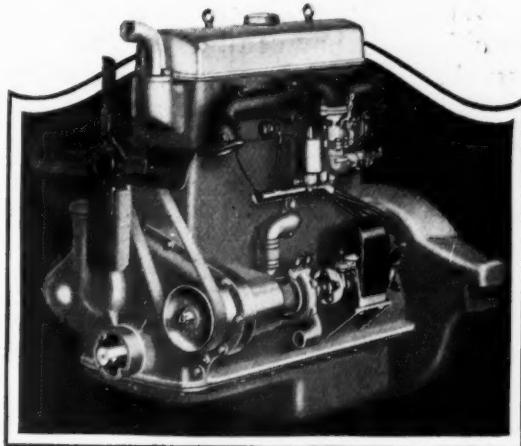
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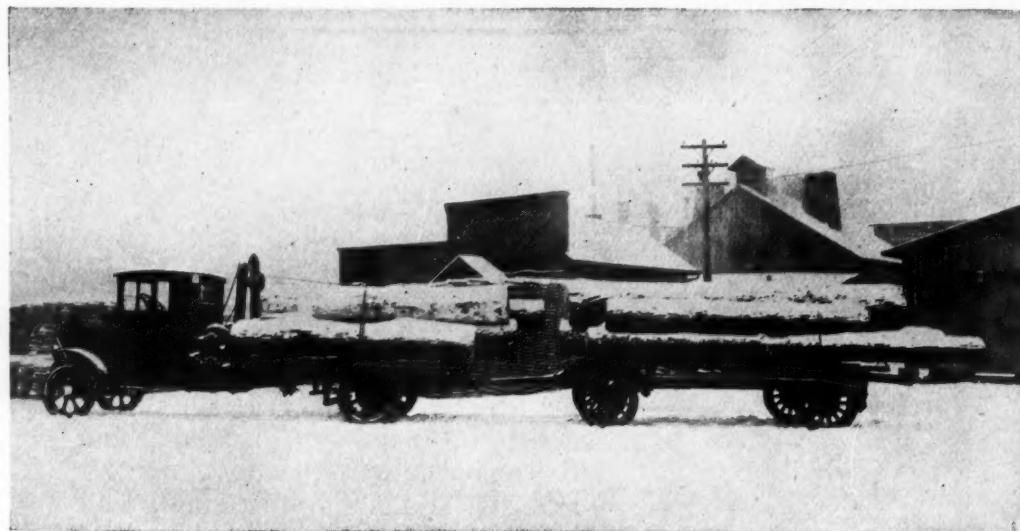
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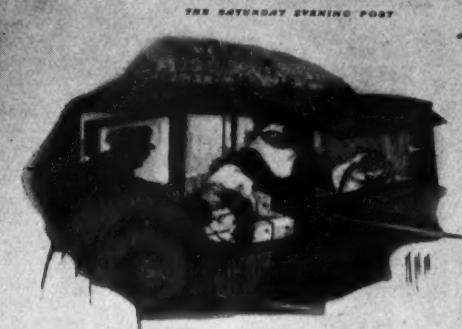
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Christmas Candlelight

GOLDEN GLEAMS ACROSS THE SNOW . . . Laughing voices in the dusk . . . Princesses and Knights in package-filled motor cars, slowly weaving in and out through the colorful shopping crowds.

Your car! A vibrant blue against the merry reds of Holly and Poinsettia—in its lustrous DUCO finish, whose soft velvety glow becomes more beautiful with the passing of time.

The bleakness of the Winter's fiercest storms will not injure its surface—and the Summer's broiling sun will not crack nor mar its satin glory.

Next Christmas its slumberous color will still thrill you!

E. I. DU PONT DE NEMOURS & CO., INC.

Chemical Products Division

PARLIN, N. J.

FLINT, MICH.

Canadian Distributors: Flint Varnish & Color Works, Toronto



Miniature reproduction of color advertisement appearing in the December 13th issue of The Saturday Evening Post.



Holiday Greetings!

FROM every motor salesroom—and the busy thoroughfares outside, DUCO finished cars glow in the lights of Christmastide.

New cars and refinished cars—cars of every make and price class—show that in the past year Genuine DUCO has more than proved itself in the eyes of manufacturer and public alike.

Next year these same cars will go about their Yule-time business, as richly beautiful as they are today!

E. I. DU PONT DE NEMOURS & CO., Inc.

Chemical Products Division:

Parlin, N. J.

Flint, Mich.

Canadian Distributors: Flint Varnish & Color Works, Toronto

Duco is factory standard on: Hupmobile (all models); Jewett (all models except Standard Brougham); Marmon (all models); Maxwell (all models); Moon (all models); Oakland (all models); Oldsmobile (all models); Buick (all Sport Models); Cadillac (Roadster); Chevrolet (all de Luxe Models); Gardner (Special Touring Models); Meteor Motor Car Co. (Standard); Nash (Special Six Touring, Special Six Sedan, Advanced Six Sedan)

Over 600 Duco Refinishing Stations have already been established throughout the country. Training schools are being organized as rapidly as possible.

DUKO



MURRAY SHEET METAL *Parts*

It is particularly hard to express to you the quality of Murray Sheet Metal Parts.

Our Production men, methods and facilities must be inspected to obtain an adequate knowledge of our ability to surely deliver a fine product.

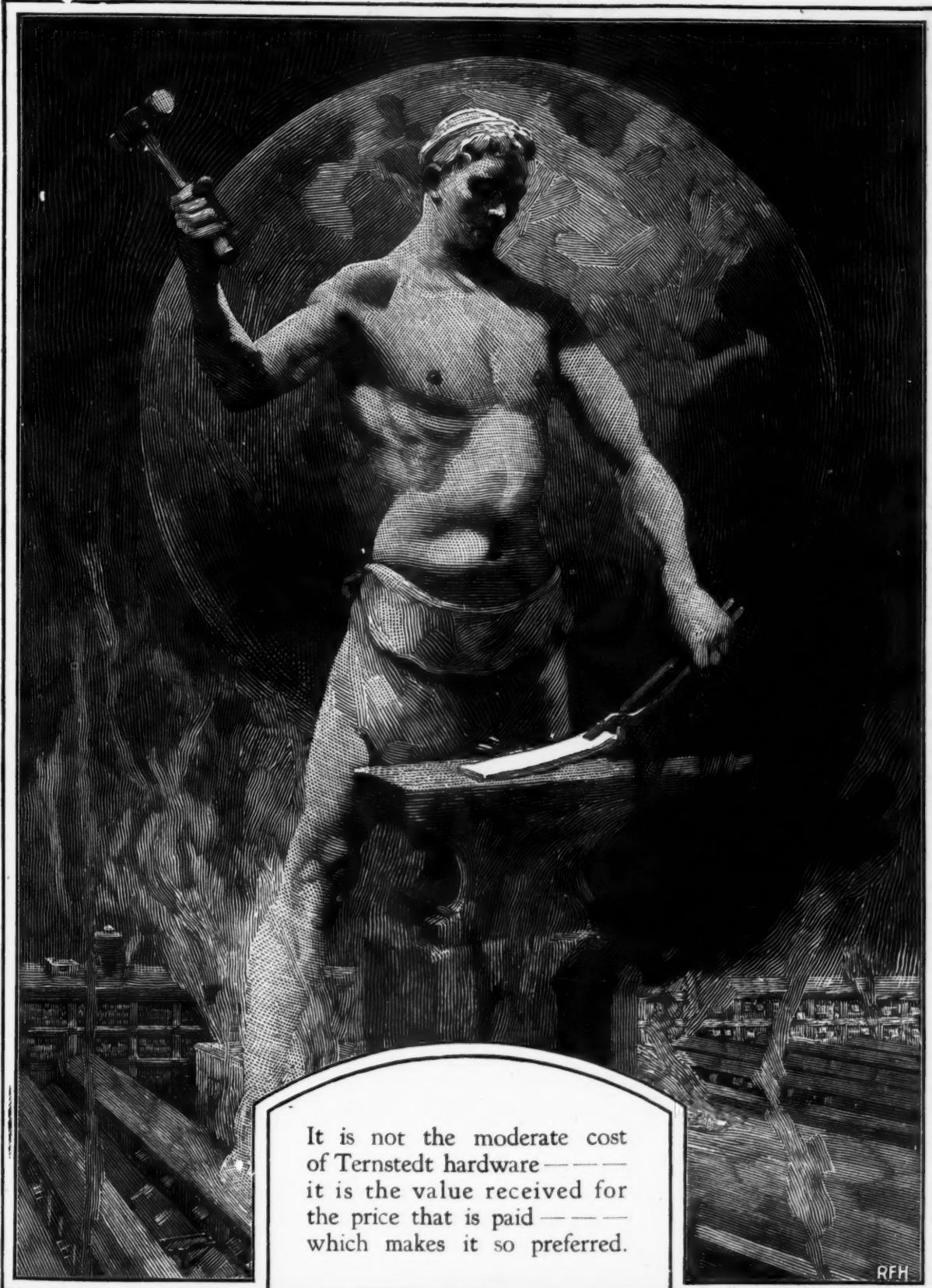
J. W. MURRAY MANUFACTURING COMPANY

Detroit

Cleveland

St. Louis

Elizabeth, N. J.



It is not the moderate cost
of Ternstedt hardware — — —
it is the value received for
the price that is paid — — —
which makes it so preferred.

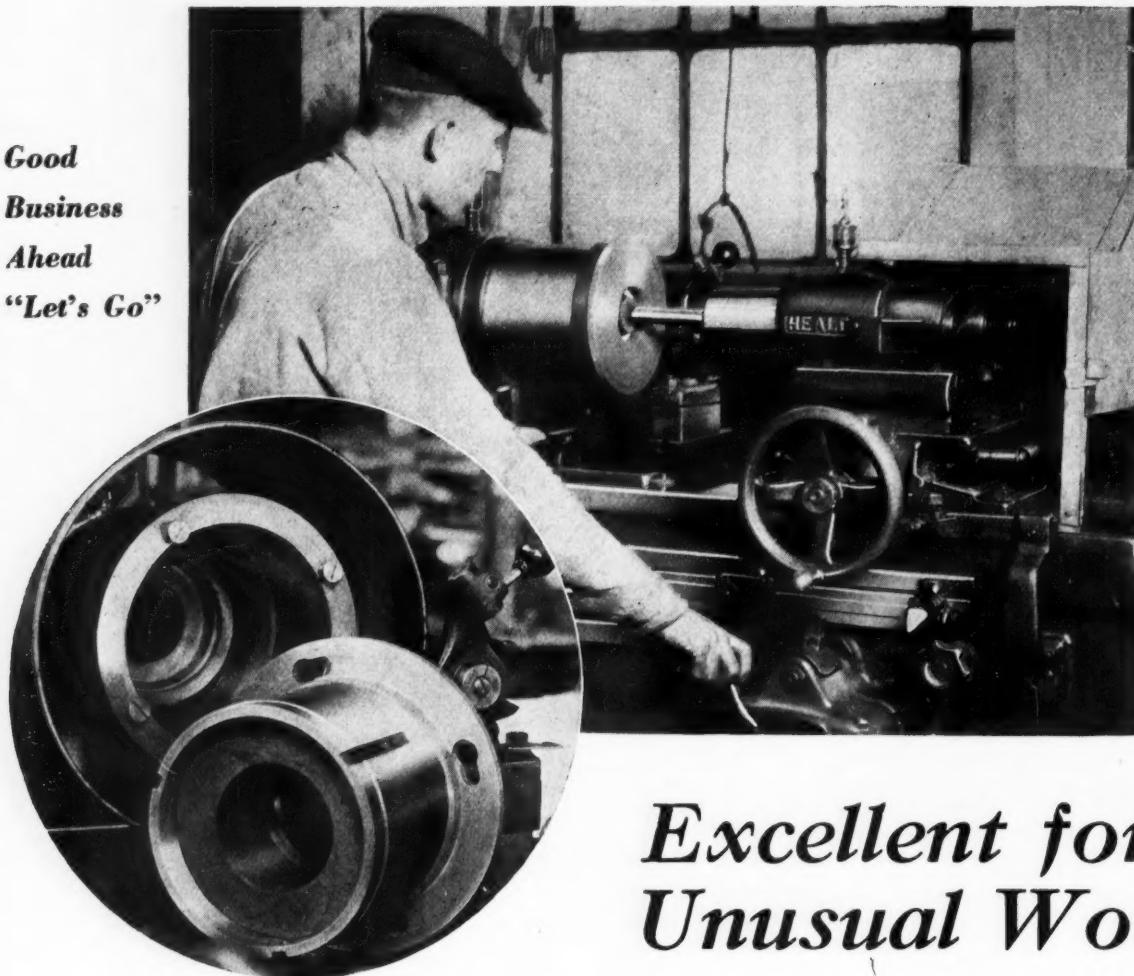
TERNSTEDT

WORLD'S LARGEST MANUFACTURERS
Division of Fisher
DETROIT

OF AUTOMOBILE BODY HARDWARE
Body Corporation
U. S. A.

National Carbon says:

*Good
Business
Ahead
“Let’s Go”*



*Excellent for this
Unusual Work*

The Heald Hydraulic Internal Grinder

Here the Heald Hydraulic Internal is grinding something out of the ordinary and yet it was found because of this machine's powerful drives, ease of operation and convenient loading fixture, that it was the ideal tool for grinding the holes in these turbine packing rings.

They are made of carbon, a very unsatisfactory material to machine, especially where accuracy is demanded and yet the Heald Hydraulic is removing one-eighth of an inch stock at a cut, holding it to + or —.001 doing six rings at a time. The insert shows the loading fixture which holds by end pressure.

Regardless of what your internal work is, consult our Service Engineering Department. It does not cost you anything and they may be able to give you data that will be invaluable to you. Send us in prints or samples.

Other installations of the Heald Hydraulic will be shown bi-weekly. Watch for them.

THE HEALD MACHINE CO.

11 New Bond St., Worcester, Mass.





THE season is at hand when men put aside the tools of industry and give themselves over to the spirit of Christmas.

Next month, at inventory-taking time, everyone will have the opportunity to check up on his achievements and mistakes of the dying year. Then, users of **GTD** products will have occasion to feel a little bit better satisfied with the year's work than some others. But today, everyone can radiate Good Cheer and Good Will.

We add our mite by Wishing one and all a very Merry Christmas and a Bright and Happy New Year.



Come to Headquarters!

IF You Have Money to Burn

Then:

The High-speed Gear Shaper will not interest you. Because:

This machine will save you money.



BUT If You Want To

operate your gear cutting department on a profitable basis, then you are losing money every day you delay installing High-speed Gear Shapers.

DON'T take our word for it.

Ask any user of High-speed Gear Shapers.

Their names are Legion.

Send for descriptive literature

THE **FELLOWS**

Gear Shaper Company, Springfield, Vermont, U. S. A.

Branch Office: 505 Book Building, Detroit, Mich.

GEAR SHAPERS

GEAR-TOOTH GRINDERS

THREAD GENERATORS



New Departure Ball Bearings

*Marvelous New Speed Record
on New Departures*

BENNETT HILL tore his way to victory in the last of the season's races at Los Angeles—250 miles without a pause—8 miles per hour faster than the previous world mark. His telegram follows:

Los Angeles, Calif. W. U. T. Co. 12-15-24.

"New Departure ball bearings used throughout my car performed as usual yesterday, greatly aiding me in winning the annual Los Angeles race without a stop at an average of one hundred, twenty-six and nine-tenths miles per hour, exceeding previous world's record for the distance by eight miles per hour.
Bennett Hill."

It is just such confidence in the absolute dependability and high efficiency of New Departures that has prompted 95.9% of American automobile manufacturers to use them in 1925.

THE NEW DEPARTURE MANUFACTURING COMPANY
BRISTOL, CONN.

DETROIT

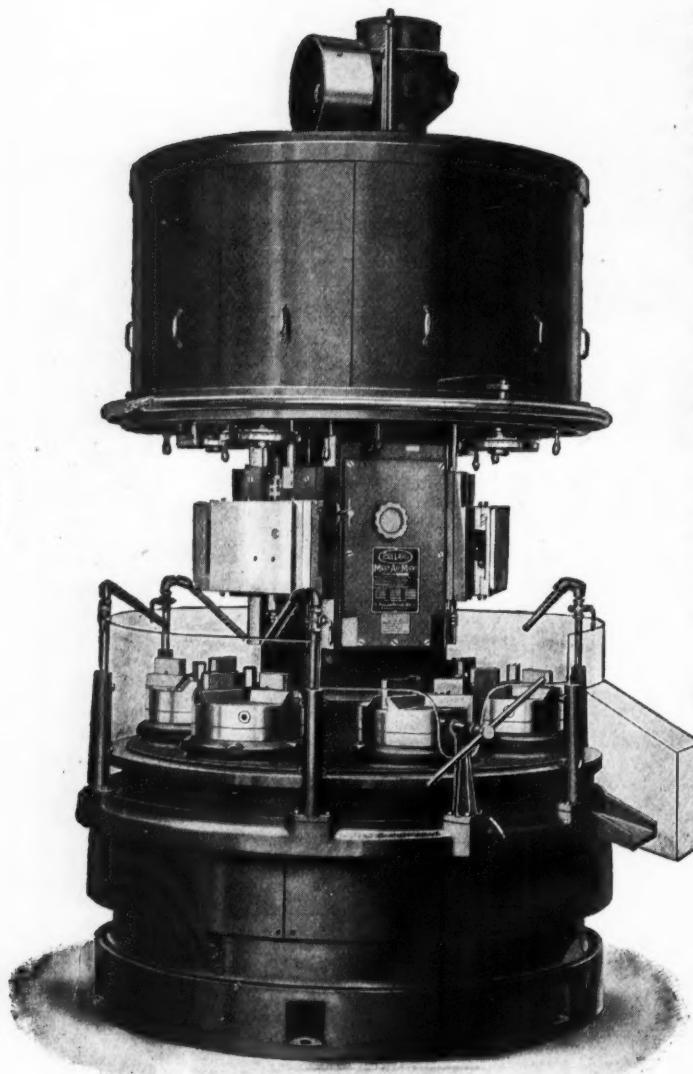
CHICAGO

103

Ball Bearings Do Not Wear

Bullard Economy

Is A 1925 Necessity



Alloy Steel forgings for transmission gears are handled on the Mult-Au-Matic in from 30 to 36 seconds each, with a production of from 765 to 918 a day, according to size. You will find it interesting to compare this production with yours on similar work.

Three Mult-Au-Matics producing an automotive part at the rate of one a minute averaged at the end of two months **ninety pieces for every one hundred minutes of shop time**. These three machines and their operators replaced thirteen machines and thirteen men required by previous methods. Labor saving alone amounted to over \$25,000 per year. The additional economy of tool expense, power consumption, floor space, maintenance, supervision and inspection brought the total savings in the first year to more than the cost of the whole installation.

Six Mult-Au-Matics installed for the production of automobile hubs replaced twenty-eight other machines, reduced floor space six hundred square feet and eliminated fifteen men from the payroll. The total saving in this case was over \$100,000 for the first year—greater than the original investment.

One Mult-Au-Matic installed for the production of eight different parts is used for machining quantities of two hundred and fifty or more of each at one set-up. Economies resulting from this installation total sufficient to pay back the original investment in less than two years.

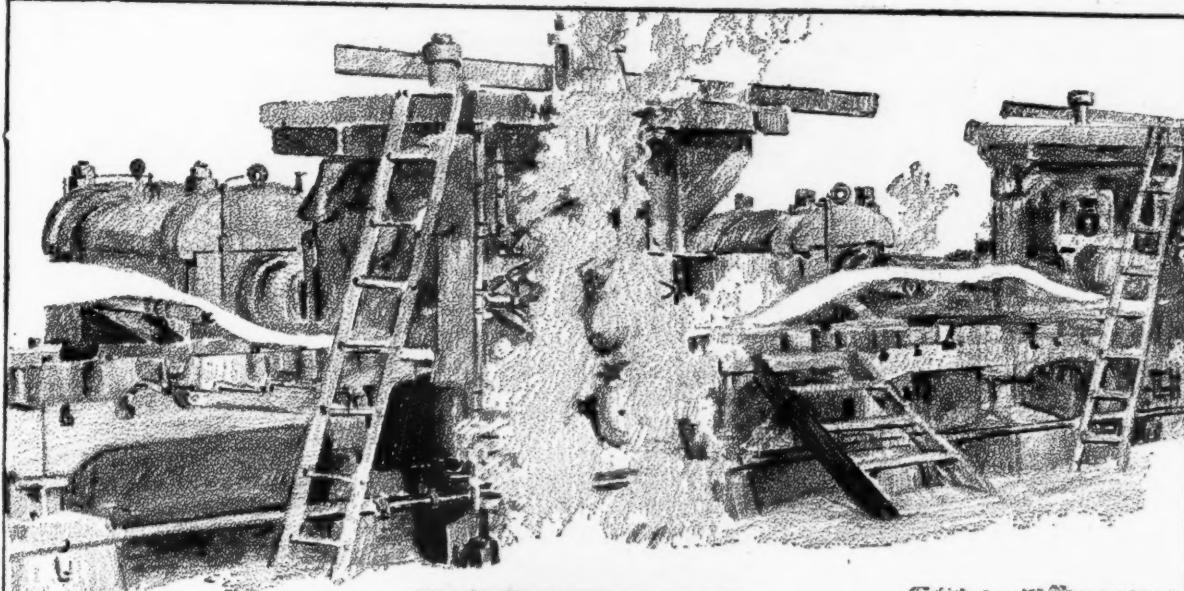
And for even greater variety in a recent installation one machine has been tooled for fourteen different jobs. The scope of this unit includes your work.

The Bullard Machine Tool Co.
Bridgeport, Conn.



BULLARD

MULT-AU-MATIC



O T I S

STRIP STEEL

HOT & COLD ROLLED

You can look a long way in any steel mill before you will find the equal of Otis (hot and cold rolled) Strip Steel.

We have an added advantage in new and modern mills and equipment, the best that money could procure.

Our hot strip is finished at a high temperature in coils producing an excellent deep drawing quality with very accurate and uniform gauge.

Send us your inquiries.

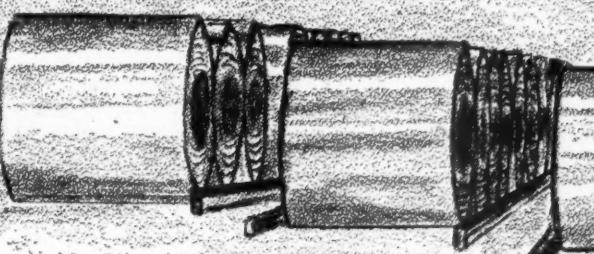
The Otis Steel Co.

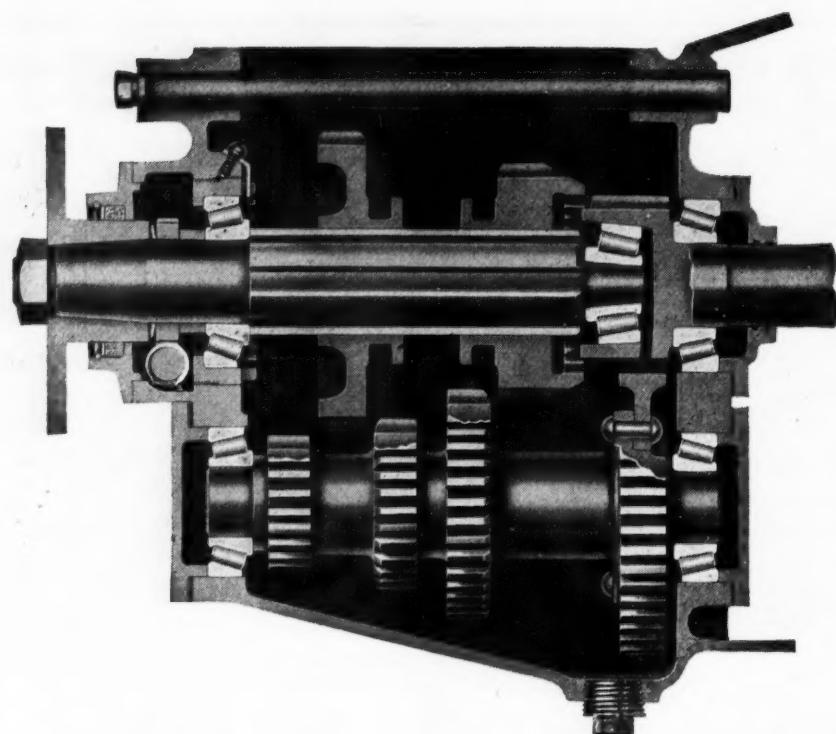
(Pioneer Producers of Quality Steel Plates)
Cleveland, O.

District Offices

New York, N. Y., 26 Cortlandt St.
Chicago, Ill., First National Bank Bldg.
Detroit, Mich., General Motors Bldg.
Milwaukee, Wis., First Wisconsin Bldg.

Also producers of Blue Annealed, Full Finished, and Automobile Body Sheets; Furniture Stock; Plates; Pig Iron; Steel Rolls; and Steel Castings.





Before and After "Breaking In"

When a car is being "broken in", power losses as between one anti-friction bearing and another are negligible. They are negligible both in themselves and also in comparison with other losses.

But after the car has seen service, there can be considerable loss if the bearings wear loose. For then gear friction gets in its deadly work. Also there is noise.

Timken Bearings assure a smooth, quiet transmission—not merely when the car is new, but more important still, *when it is old*. They do this because they have a greater load carrying area, and therefore wear less. And they stand up with equal vigor under radial load or end thrust.

THE TIMKEN ROLLER BEARING COMPANY
CANTON, OHIO



©1924, T. R. B. Co.

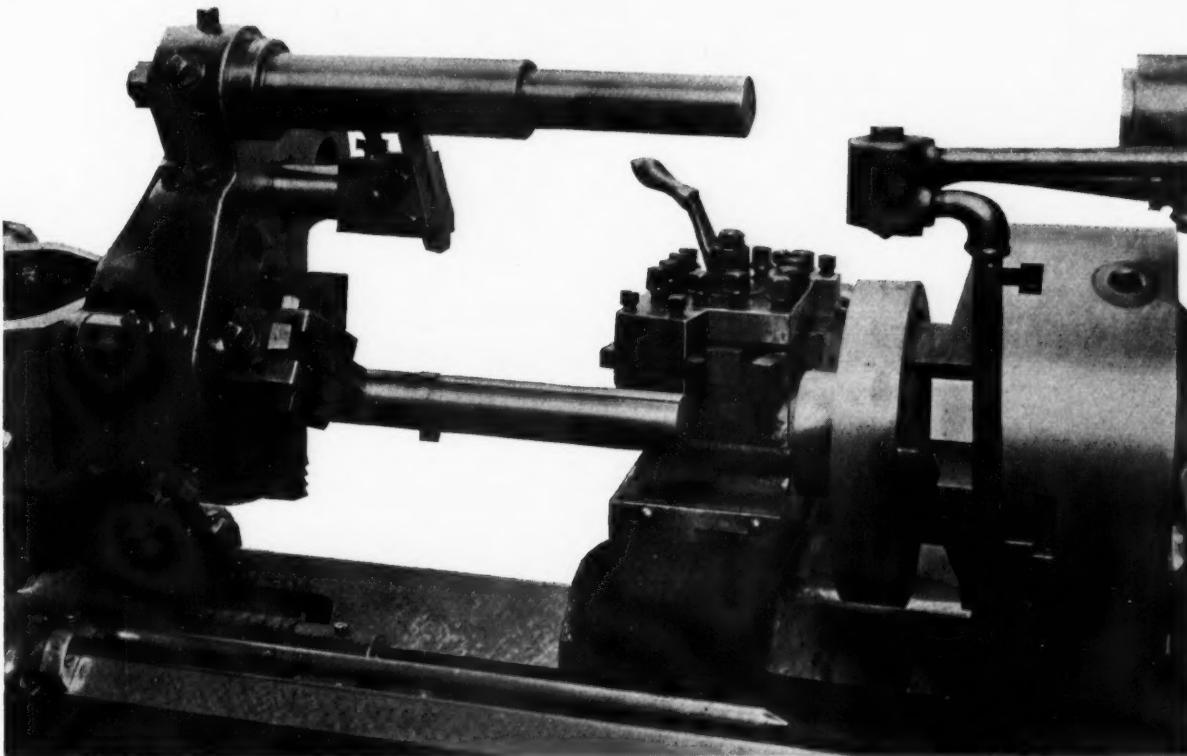
TIMKEN
Tapered
ROLLER BEARINGS

The New W&S Turret Lathe— Overhead Piloted Tools

The next very exacting turret lathe job you have investigate Warner & Swasey Overhead Piloted Turning Tools. When using these overhead piloted tools you are sure of exact duplication; you are sure of extreme accuracy.

Send for detailed description.

No. 1-A 2½" x 26" Bar Capacity—12" Chuck Capacity



Overhead Piloted Plain Turning and Facing Head, mounted on a No. 1-A Turret Lathe
(Patent applied for)

The Warner & Swasey Company CLEVELAND, OHIO, U. S. A.

NEW YORK: Singer Building
BOSTON: Chamber of Commerce Building
 **Iroquois Building
PITTSBURGH: Chamber of Commerce Building**

PHILADELPHIA: 518 Springfield Ave., Upper Darby

DOMESTIC AGENTS: Fulton Supply Company, Atlanta; Young & Vann Supply Company, Birmingham; Woodward-Wight & Company, New Orleans; The Pedem Iron & Steel Company, Houston; Smith-Booth-Usher Company, Los Angeles, San Francisco; Hallidie Machinery Company, Inc., Seattle; Portland Machinery Company, Portland, Oregon; Hendrie & Bolthoff Mfg. & Supply Company, Denver; F. C. Richmond Machinery Company, Salt Lake City; Northern Machinery Company, Minneapolis.
CANADIAN AGENTS: Williams & Wilson, Ltd., Montreal; F. F.

DETROIT: 5928 Second Boulevard
CHICAGO: 618-622 Washington Boulevard
MILWAUKEE: 1143 Wells Building
DAYTON: 518 Mutual Home Building

Barber Machinery Company, Toronto; A. R. Williams Machinery Company, St. John, Vancouver, Winnipeg.
FOREIGN AGENTS: Chas. Churchill & Company, London, Birmingham, Manchester, Glasgow; Wm. Sonnesson & Company, Malmo, Copenhagen; R. S. Stokvis en Zonen, Rotterdam; R. S. Stokvis & Fils, Brussels; R. S. Stokvis & Fils, Paris; Anderson, Meyers & Company, Shanghai; Pacific Commercial Company, Manila; Horne Company, Ltd., Osaka; Benson Brothers, Sydney; Allied Machinery Company, Turin; Allied Machinery Company, Barcelona; Oscar Taves & Company, Rio de Janeiro.



BROWN-LIPE-CHAPIN

DIFFERENTIALS — BEVEL DRIVE GEARS

WHEN it is remembered how important a good differential is to uninterrupted motor car performance, it is easy to understand why so many automotive manufacturers insist on Brown-Lipe-Chapin units for the rear axle assembly.

Manufactured at Syracuse, N. Y.





Imagine the Leviathan being driven by automobile engines. It would require nearly two thousand to do it. Yet half a day's output of Harrison radiators would cool them.

HARRISON RADIATORS

HARRISON RADIATOR CORPORATION, LOCKPORT, NEW YORK



THE MARK OF RADIATOR SATISFACTION

That it outserves
and outwears
other pistons in
both the heaviest
and the lightest
motors indicates
a range of per-
formance peculiar
to Dowmetal alone.

DOWMETAL

The Dow Chemical Company
Midland, Michigan

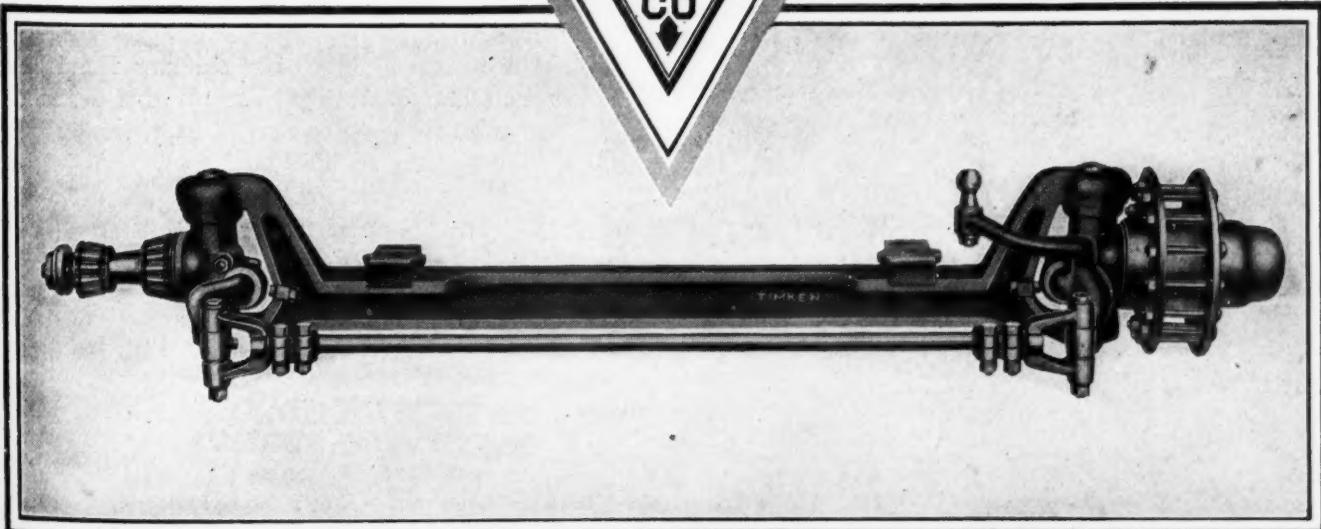
TRADE
DOW
MARK

TIMKEN

Easier steering is not always considered at its full value by truck-builders. Ask the driver, however, and you will get one more reason why he likes Timken-Detroit Fronts.

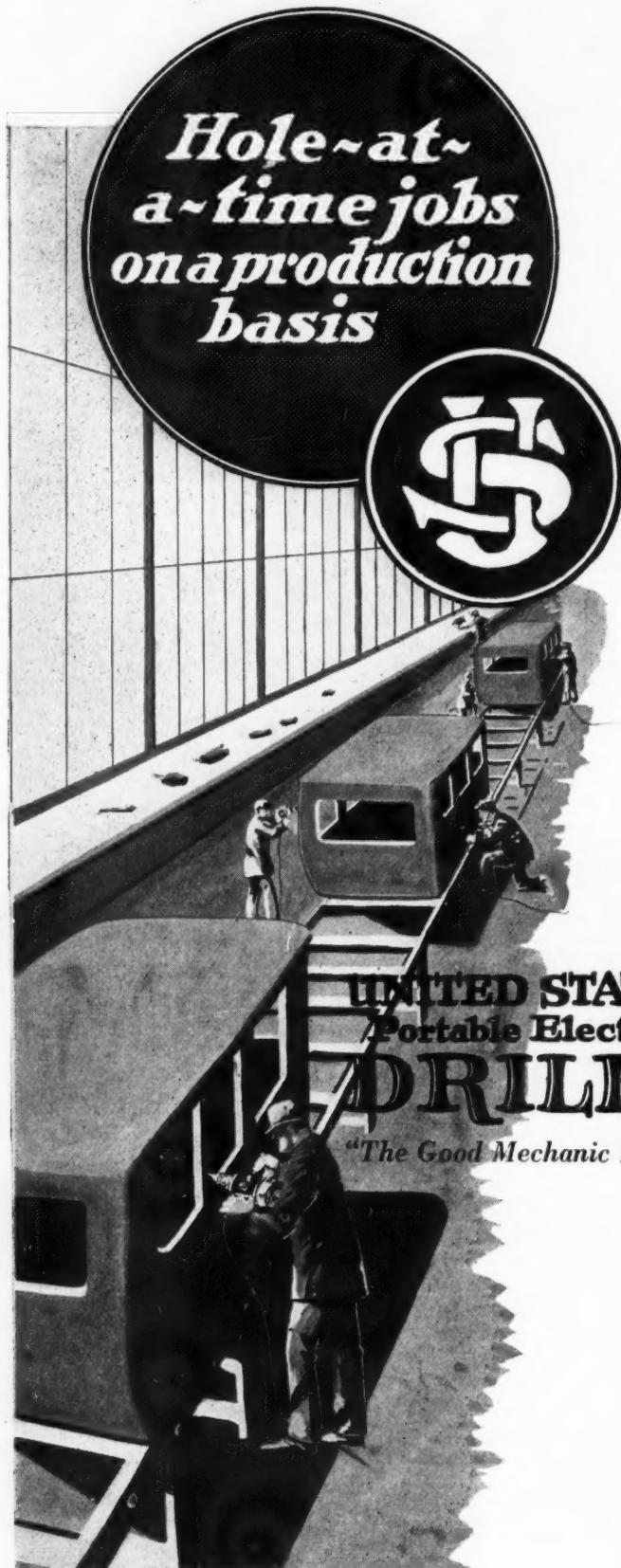
Steering-ball, steering pivot, bushings, bearings, tie-rod and general design of yoke and axle-end all show original Timken contributions to the driver's better and easier control of the vehicle.

THE TIMKEN-DETROIT
AXLE COMPANY
Detroit, Michigan



AXLES

Keep the line moving—



One of a series of advertisements on Auxiliary Drilling Equipment and its bearing on production time and costs.

If

manufacturing costs are to be kept down to a minimum, if production schedules are to be maintained, your assembly line must keep pace with the other departments. At your assembly line there are those holes to be drilled one-at-a-time—those holes that could not be drilled in multiple with the saving associated with multiple spindle equipment as a result of drilling holes on a production basis.

Here on these hole-at-a-time jobs in the assembly line, steady output and low drilling costs depend a good deal upon your portable electric auxiliary drilling equipment—on putting these *single hole* jobs on a production basis with U. S. Portable Electric Drills, the productive auxiliary drilling equipment!

With every feature for convenience of operation conducive to time and labor saving, with the dependable service you get from a U. S. Drill, with the new low prices on all types, the U. S. line offers you the best drill value for lower drilling costs in your plant.

Write for catalog 21-A and our new Handbook of Portable Electric Drill Practice that describes many uses for portable electric drills, besides just drilling on your assembly line.

(Jacobs Chucks Standard Equipment
on all U. S. Portable Electric Drills)

**The UNITED STATES
ELECTRICAL TOOL CO.
CINCINNATI, OHIO.**

District Sales Offices and Service Stations

Boston
Buffalo
Chicago
Cleveland

Detroit
Houston
Kansas City
Minneapolis
New York

Philadelphia
Pittsburgh
St. Louis
Toledo

Complete stocks carried in all Service Stations





The ^{F.W.D.} Boring Machine and Link-Belt Chain Drives

RELIABLE, trouble-free performance of Link-Belt Silent Chain in the gear box of the F.W.D. truck chassis since 1910, led to the adoption of Link-Belt Roller Chain on the new F.W.D. Earth Boring Machine.

More than 70 feet of Link-Belt Roller Chain are used on the digging and pole-setting mechanism, delivering power efficiently at every point.

We have been chain makers for 50 years. Our experience is yours for the asking. Let our experienced engineers work with yours.

Layout of Link-Belt Roller Chain Drives on the
F.W.D. Earth Boring and Pole Setting Machine

LINK-BELT COMPANY, INDIANAPOLIS

1899

LINK-BELT

Silent and Roller Chain Drives

The Good, Old Gear Drive!



EVERY engineer has a confidence in the old time gear timing drive that he has never been able to feel in later expedients brought in to satisfy the demands of the sales departments for silence.

Now with Formica gear blanks, the tried and proven standby is available in a form that meets every requirement of modern conditions.

Properly cut, designed and installed in an engine that is right for them, Formica gears can be depended on for perfect silence — and 30,000 miles or more of it. They absorb the shocks that hasten crystallization because they are slightly elastic.

Formica has the largest and most modern equipment in America for the production of laminated phenolic material. A big organization specializes on just this one thing — and has done so ever since the material was known to industry. Therefore, the material is wonderfully uniform and wonderfully adapted to requirements.

You can recognize it by three black stripes through the blank.

Formica engineers will gladly assist in adapting Formica to your engine.

THE FORMICA INSULATION COMPANY
4622 Spring Grove Avenue, Cincinnati, Ohio

FORMICA
Made from Anhydrous Bakelite Resins
SHEETS TUBES RODS



The Perfect Combination

An Empire cold punched nut fitted to an Empire New Process bolt will banish any worry connected with assembly work.



Empire cold punched nuts are made on machines that reduce five operations to one—thus insuring an absolutely uniform accuracy of fit and flawlessness of structure.



Empire New Process bolts are made by building-up the thread in a new way without cutting. This makes the thread tremendously strong and gives it an accuracy of .0005."

Samples on Request

RUSSELL, BURDSALL & WARD ◎ BOLT & NUT COMPANY ◎

PORT CHESTER, N.Y.

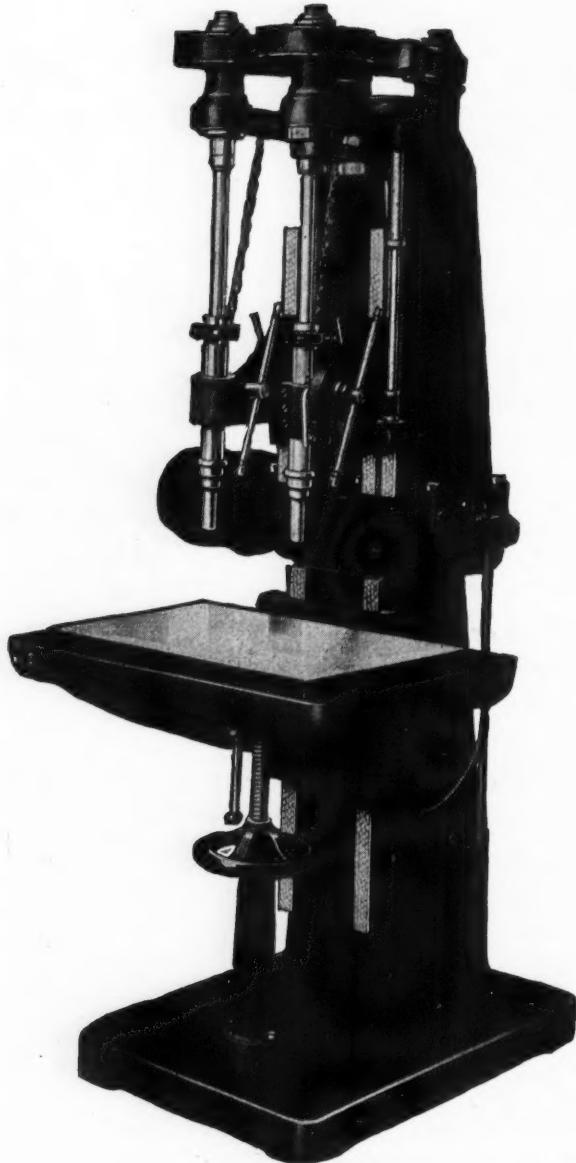
PEMBERWICK, CONN.

CHICAGO - SAN FRANCISCO

ROCK FALLS, ILL.

Makers of Bolts, Nuts and Rivets Since 1845

Vibration in any Drill Press Slows Up Production



Vibration in a drill press takes its toll in many ways. It consumes far more power while delivering less at the drill-point, runs up maintenance costs, cuts down operating speeds, and shortens the life of the machine.

These items constitute a heavier overhead than any drilling operation should be expected to carry—they make the cost-per-hole higher than it needs to be.

In the VIKTOR, due to the advanced design, THERE IS PRACTICALLY NO VIBRATION. The hand held against the spindle sleeve tells the story. A high-production machine-tool in every sense of the term. Of such sensitivity that the smallest drill can be used, yet with such power that a $\frac{3}{4}$ " drill can be burnt.

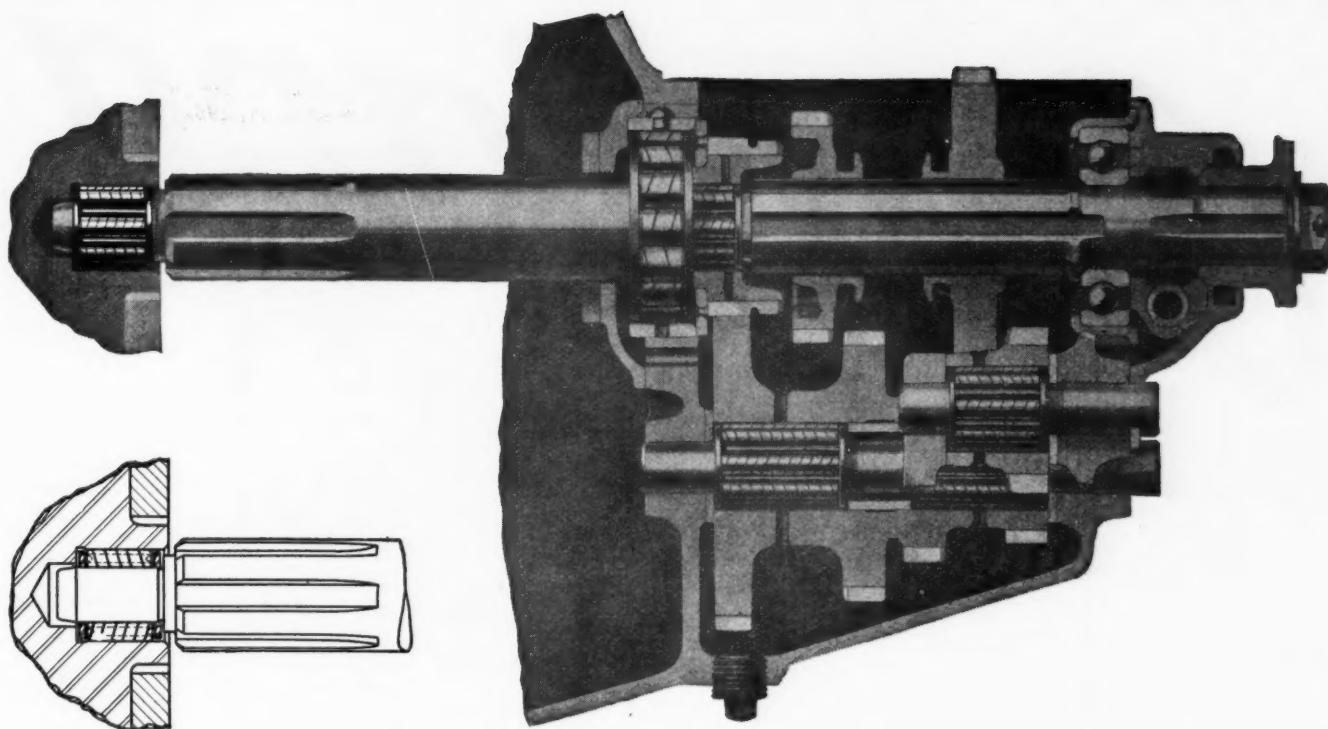
FULL AUTOMATIC FEED paces operator, and insures during the last hour of the day the same high production as during the first.

We are in the position to tell any factory-manager how he may cut costs in his drilling department. Send us your blueprints for an estimate—to compare with what you are getting now.

1, 2, 3 and 4-spindle types.

The Henry & Wright Mfg. Co.
HARTFORD, CONN.

VIKTOR
DRILLING MACHINE



Higher Quality Transmissions at Low Cost

No. 5 Clutch Pilot

Competition today demands improved motor car construction at an even lower cost. Automotive engineers are solving this problem at the clutch pilot position through the use of Hyatt roller bearings. Mounted in the end of the crankshaft, as illustrated, a Hyatt roller assembly —

1. Eliminates the most common cause of complaint at this location—faulty lubrication. Once packed with grease it needs no further attention.
2. Affords quiet operation. Hyatt rollers dampen noises, do not freeze, whistle or rattle. They run smoothly and quietly without the attention which other bearings must have.
3. Facilitates assembly. Ordinarily an awkward operation, this blind assembly is made much easier through the use of a Hyatt bearing.
4. Assures long life. Rust, corrosion and wear are kept to a minimum.
5. Reduces cost. The saving in anti-friction bearing cost will merit your investigation.

Solve your clutch pilot problem by using a Hyatt bearing at this location.

HYATT ROLLER BEARING COMPANY

NEWARK DETROIT CHICAGO SAN FRANCISCO

MILWAUKEE

WORCESTER

CLEVELAND

PITTSBURGH

PHILADELPHIA

HYATT
Quiet
Roller Bearings

Raulang

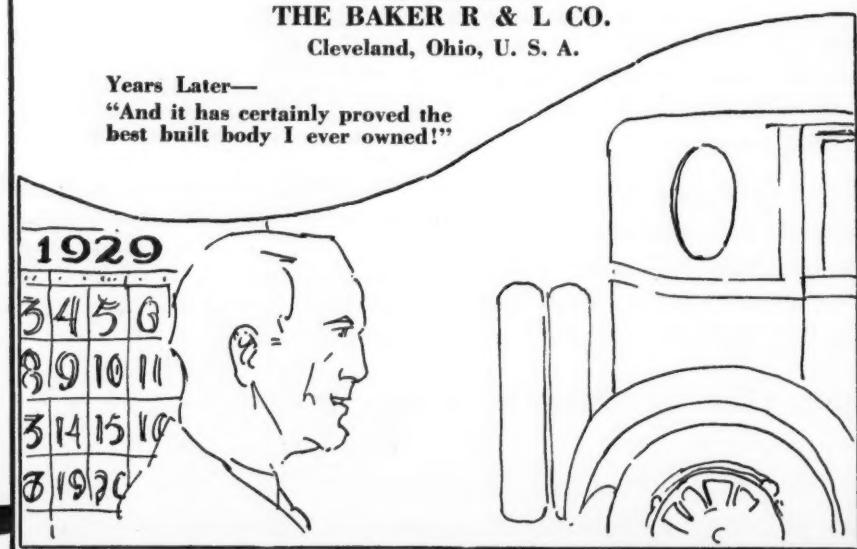


Beauty of appearance is important at the Shows and on your sales floor. But after the car is *sold*, "beauty is as beauty does." Right there are *two* reasons why your car should have Raulang-built enclosed bodies.

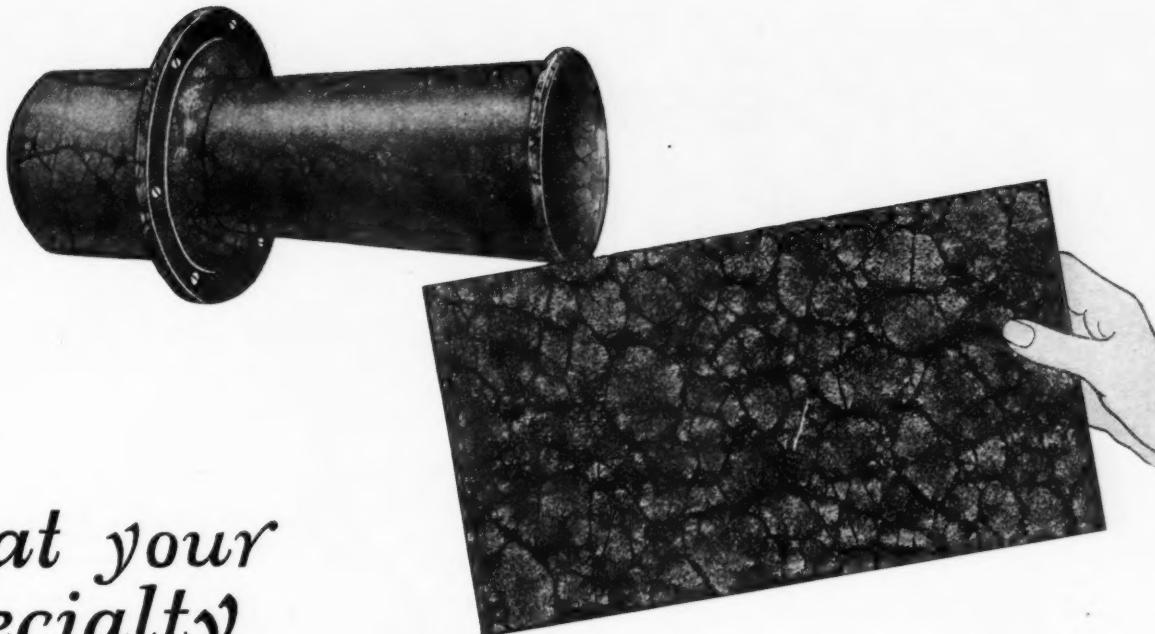
And a third is that Raulang facilities make quality possible at as low a *price* as can be obtained anywhere. And a fourth is that the stability of this company, and its record of promise keeping, are your best assurance of beauty, quality and price being *actually delivered*.

Raulang Body Division
THE BAKER R & L CO.
Cleveland, Ohio, U. S. A.

Years Later—
"And it has certainly proved the best built body I ever owned!"



Raulang



Treat your Specialty to this "New Finish"

LIKE jewels, softly glinting and sparkling, such is the rare effect of Hilo Crystallizing Lacquer.

This new finish is brushed or sprayed on, the same as clear varnish. It is durable, as resistant to wear and weather as finishing varnish. Any color over which it is applied shows thru attractively

Hilo Crystallizing Lacquer adheres to all metals: cast iron, sheet steel, brass, aluminum; also to Bakelite, wood, glass, fibre. It can be applied over celluloid lacquer, enamel, varnish, shellac, stain.

Finishing costs are lower with Hilo Crystallizing Lacquer because less undercoat preparation is needed.

Make the unique attractiveness of Hilo Crystallizing Lacquer give your specialty added sales power. Use it right over your present finish.

Send for working sample and Bulletin 8, describing the simple operation of getting good results with this "New Finish."

HILO VARNISH CORPORATION

Brooklyn: 1 Gerry St. Williamsburg 5380

CHICAGO: 2420-24 WASHBURN AV.—SEELEY 0150
BOSTON: 104 HANOVER ST.—CAPITOL 4832
PHILADELPHIA: 27 SO. 4th ST.—LOMBARD 7723



Hilo Crystallizing Lacquer

THE SILVER JUBILEE AUTOMOBILE SHOWS

TWO DAYS AT EACH SHOW FOR THE INDUSTRY ONLY

At New York

For the Trade Only

Friday, Jan. 2,
10 A.M. to 10:30 P.M.
Saturday, Jan. 3
10 A.M. to 7 P.M.

For the Public

Saturday, Jan. 3, 7:00 to
11:00 P.M.
Monday, Jan. 5 to Saturday,
Jan. 10, 10:00 A.M. to 11
P.M.

AT THE BIG ARMORY,
KINGSBRIDGE ROAD AND
JEROME AVENUE.

180,000
FEET OF SPACE WITHOUT
AN OBSTRUCTION.



Silver Jubilee Tower at the Auto Shows

ADMISSION on Trade Days will be free, but strictly confined to manufacturers of cars, parts and accessories, dealers, jobbers, garage owners, purchasing agents, factory superintendents, engineers, production managers, fleet owners and others actually engaged in the industry, so that the exhibits may be examined without crowding and business transacted with reasonable privacy.

THOSE who are entitled to Trade Days' tickets can secure them by writing to S. A. Miles, Manager, 366 Madison Avenue, New York, or by making themselves known at the Show entrances.

At Chicago

For the Trade Only

Friday, Jan. 23
10 A.M. to 10:30 P.M.
Saturday, Jan. 24
10 A.M. to 7 P.M.

For the Public

Saturday, Jan. 24, 7:00 to
10:30 P.M.
Monday, Jan. 26, to Saturday,
Jan. 31, 10:00 A.M.
to 10:30 P.M.

AT THE COLISEUM, AN-
NEX AND THE NEW
NORTH HALL. THE EN-
TIRE SHOW UNDER ONE
ROOF.



"The kind of *quality* *built into the Packard Six"*

"Ask the man who owns one." Let him tell you how Nickel Steel makes Packard a long-lived car.

"Ask the man who owns one." Let him tell you how Nickel Steel parts stand wear, hard use and thus hold upkeep costs down to a minimum.

All automobile manufacturers now recognize the importance of Nickel Steels in automobile construction. Most of them make liberal use of Nickel Steels to insure built-in quality.

Nickel steel

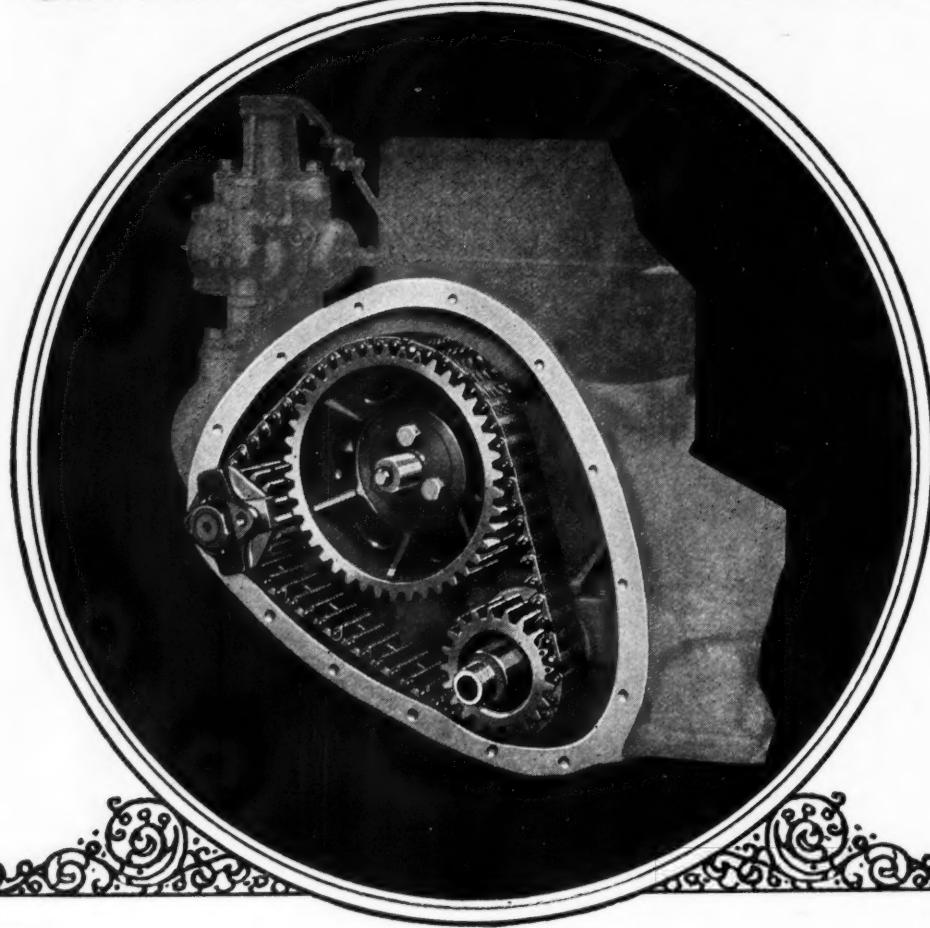
SEND FOR "LIST B" OF AVAILABLE LITERATURE

THE INTERNATIONAL NICKEL COMPANY, 67 WALL STREET, NEW YORK CITY.

Packard engineers have spent years in study and experimental work on every piece of a Packard car to determine just what material is best suited for each particular piece. Because of the known result of this research work—the quality of a Packard—the liberal use of Nickel Steels throughout the car is particularly eloquent testimony to Nickel Steel's strength, durability and ultimate economy.

MORSE

GENUINE SILENT CHAINS



There Is Only One Standard!

The inbuilt dependability of Morse Chains has made them an envied standard for front end drives.

Automobile engineers specify Morse Chains because they know that definite results are assured.

Morse Chain Standard Installations

Anderson Six (41)
Auburn Six (43)
Barley Six
Cadillac Eight
Case Six (Y)
Chandler Six
Chrysler Six
Cleveland Six
Columbia Six

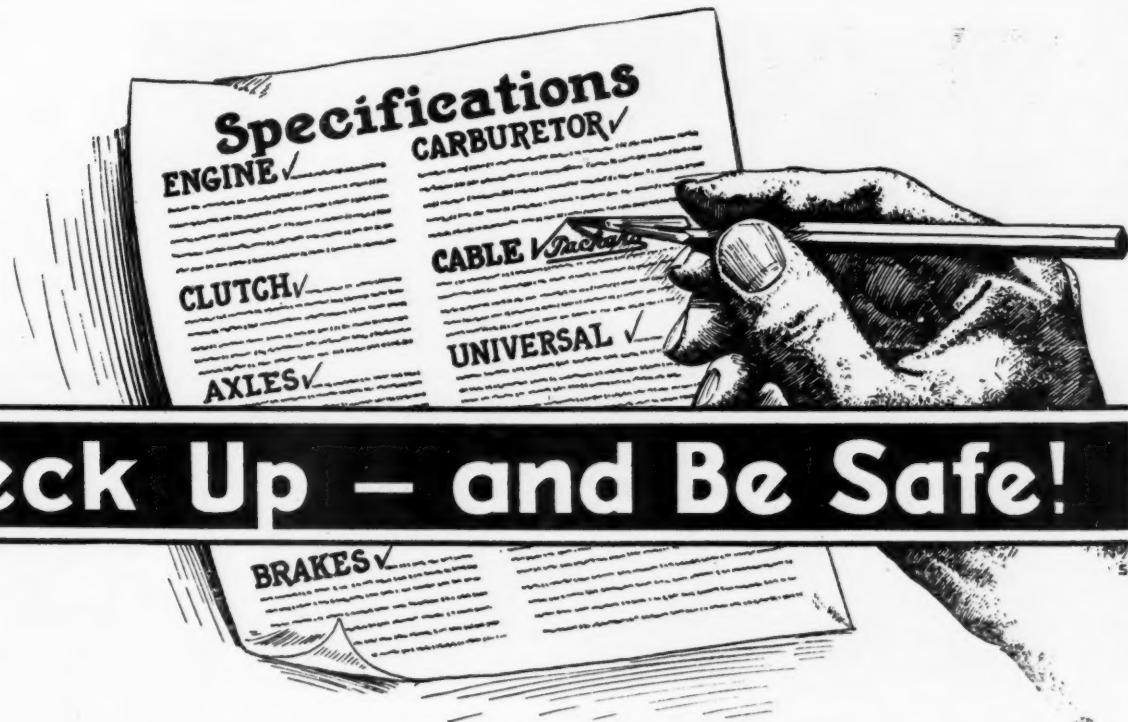
Crawford-Dagmar Six
Davis Six (90)
Elcar Six (51)
Essex Six
Flint Six (40)
Flint Six (55)
Hudson Six
Hupmobile Four
Hupmobile Eight

Jordan Six
Jordan Eight
Lincoln Eight
Moon Six (40)
Moon Six (A)
Northway ('Com'l)
Oakland Six
Packard Six
Packard Eight

Peerless Six
Rickenbacker Eight
Stearns Four
Stearns Six
Sterling-Knight Six
Studebaker
Standard Six
Star Four
Continental Motors

MORSE CHAIN COMPANY
Main Office and Works
ITHACA, NEW YORK

Sales and Engineering Office
DETROIT, MICHIGAN



Check Up — and Be Safe!

You check up on the dependability of the engine, axle, transmission and other major units on your chassis assembly.

But do you make equally sure of the dependability of the smaller, though vital, units which must function perfectly, uninterruptedly—or the others don't? One of the most vitally important units of any automotive vehicle is its cable system, without which the starting, lighting and ignition systems would be utterly useless.

It is not possible to get cable which is too good for the gruelling service which it is called upon to perform. A poor cable system is one of the most expensive units which could be built into your car.

Cable trouble is without question one of the meanest forms of trouble that the mo-

torist can possibly encounter. Fires, balky motors and the nightly hazard of meeting the fellow with only one eye, are a few of the crimes laid at its door, not to mention family quarrels and profanity.

Many of the leading manufacturers, as well as the better class of dealers have come to the conclusion that it pays to specify "Packard"—the standard cable of the automotive industry for over 20 years.

When you consider the matter carefully, can you really afford to specify anything but "Packard"?

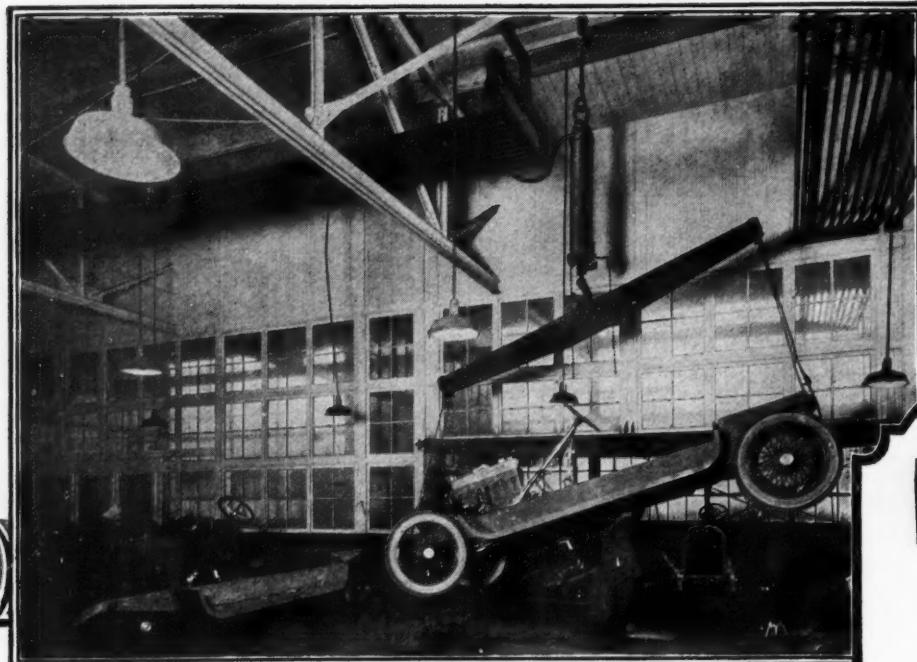
The ultimate reputation of your product rests largely upon the dependability of the chassis parts—of which the cable system is truly a vital unit.

Check up these vital units and make sure that "Packard" is specified.

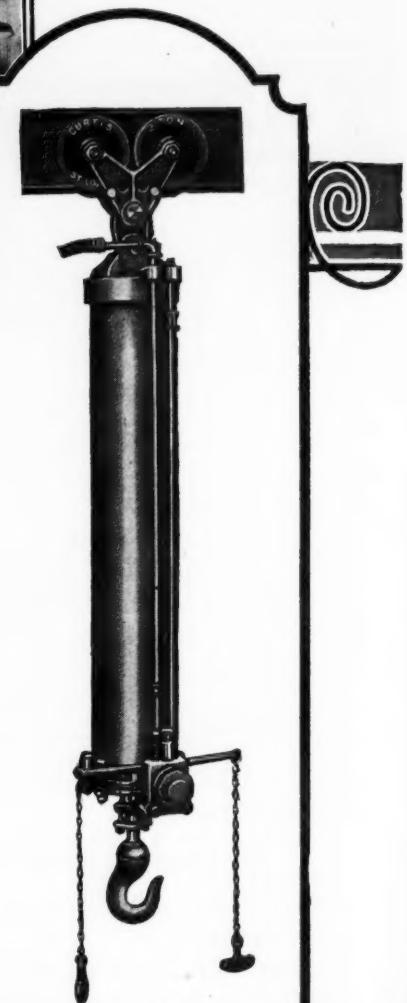
The Packard Electric Company
WARREN, OHIO

Packard Automotive Cable

The Standard For Over Twenty Years



Typical Curtis Air Hoist installation, showing how Curtis adapts air to any lifting problem.



Lift With Air *Economical—Safe—Speedy*

Compressed air provides economical power for the safe, speedy lifting and transfer of heavy castings, structural shapes, machines, assemblies or parts.

Curtis All-steel Air Hoists and Roller-bearing Trolleys make use of power already available in most plants. With them you can keep your production keyed to the proper point—you can move materials between machining or assembly operations with the necessary rapidity—keep your labor cost at its proportionate level. You save time, energy and men—before, during and after machining operations.

Curtis Hoists are safe and positive in action—with Curtis I-Beam Trolleys a 4000-lb. load can be moved by a 50-lb. pull.

Furnished in capacities up to 20,000 lbs. and in various types to meet particular needs. Send for complete data.

CURTIS PNEUMATIC MACHINERY CO.

1636 Kienlen Ave. St. Louis, Mo.



Curtis Patented Pendant Air Hoist—Fast—Inexpensive—Simple—Economical.

CURTIS
PNEUMATIC
MACHINERY CO.
1636 Kienlen Ave.
ST. LOUIS, MO.

Gentlemen:—Please send me full details on Curtis Air Hoists.

Name.....

Address.....

Jobber's Name.....

Address.....

CURTIS

1854 ^{71st} ANNIVERSARY 1925

Air Hoists and Trolleys

Looking Ahead to See the Colossus Behind You

The Annual Statistical Issue

AUTOMOTIVE INDUSTRIES

Coming February 26, 1925

The mere facts of the automotive industry are astounding. Tables, charts and figures help us to grasp their tremendous import. It requires something of this character to help us visualize the tremendous growth and the wonderful extent of this great industry.

The Annual Statistical Number of Automotive Industries does this for the industry. It collects all the important facts regarding the industry and collates them in a manner which enables the reader to grasp their significance. It makes accessible vital information. It shows clearly the tendencies along manufacturing lines and is a potent help to those who are looking forward. It points out opportunities in a hundred directions for the man who thinks as he reads.

Nearly every executive in the business will read the Annual Statistical Issue and then put it within reach of his arm for reference.

Nearly every advertiser who has facts to tell these executives will sell them through the pages of AUTOMOTIVE INDUSTRIES, February 26th.

Here are some of the features that will make the issue more widely read than any we have ever printed:

1. A complete survey of the industry as an authority.
2. The staggering totals of automobile production analyzed.
3. Registrations of the United States and the World analyzed.
4. The situation regarding dealers and distribution.
5. Complete tables of specifications, American and foreign.
6. The export situation analyzed.
7. Summary of the progress of highway construction in 1924.

Reserve your advertising space now

AUTOMOTIVE INDUSTRIES

239 West 39th Street

New York



FLEXIBLE GASOLINE and OIL LINES

FOR

AUTOMOBILES, TRUCKS, TRACTORS

NEED NO "AFTER" SERVICE



Tite flex

has all the qualities that make a flexible connection desirable, together with the added feature of being ALL-METAL, and due to its special construction absorbs vibration.

Tite flex

ALL-METAL braided tubing is best suited for Automotive use, as has been proven by actual service records.



TITEFLEX METAL HOSE CO.

Badger Ave. and Runyon St.
Newark New Jersey



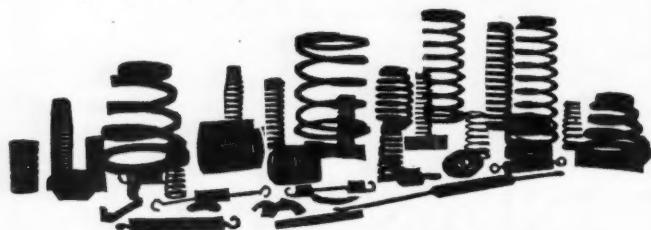
Raymond Springs demonstrate their unimpeachable quality in the severe service of heavy duty trucks. There is a Raymond Spring for every exacting purpose. Extension, compression or Torsion Springs made to your specifications. Get our quotations!

Raymond Mfg. Co.
Corry, Pa.



Raymond Springs

SPRINGS



We have specialized in high grade springs for the automotive industries since they began. Our facilities are of the best.
—Send for our booklet on springs.—

THE WILLIAM D. GIBSON CO.
1800 Clybourn Ave. Chicago, Ill.

**QUALITY
QUANTITY
DELIVERY**



the three requisites
for spring satisfaction
are component parts

**"Barnes - Made
Springs"**



*Send us your blueprints
or inquiries*



The Wallace Barnes Co.

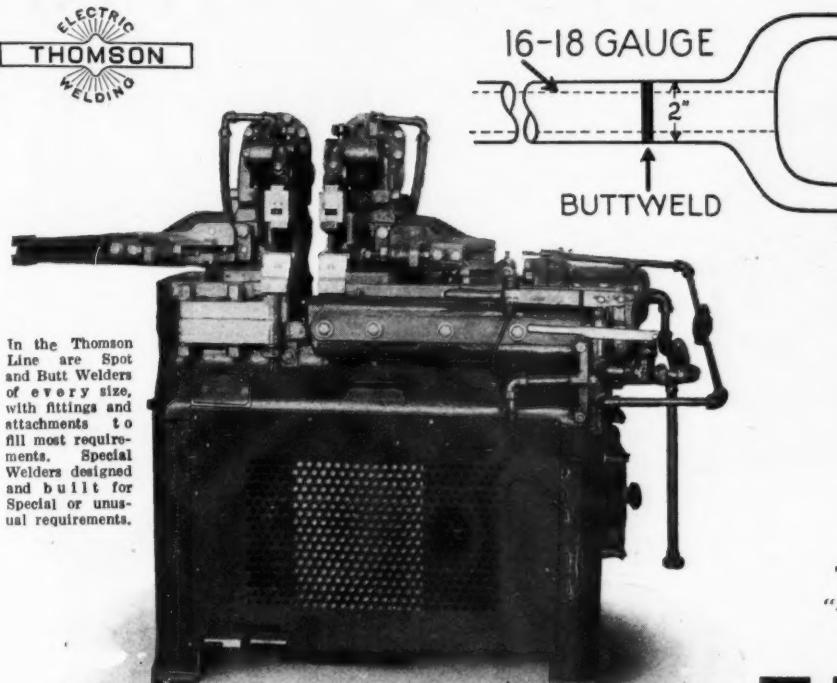
*"Spring Makers for
Three Generations"*

Bristol

Connecticut



Spider to Propeller Shaft—



In the Thomson Line are Spot and Butt Welders of every size, with fittings and attachments to fill most requirements. Special Welders designed and built for Special or unusual requirements.

Thomson Butt Welder Solved the Problem

One large manufacturer is attaching from 2500 to 3000 spiders to propeller shafts every 8-hour day on a Thomson 30 S P-Butt Welder. He is not only speeding up production but is making a lighter, cleaner connection—one that is permanent! Thomson Engineers will gladly show you the way to speed up production with this *cheapest method of joining metals*, electric welding.

Thomson Electric Welding Co.
"Pioneers in the Art of Resistance Welding"
Cincinnati, O., and Lynn, Mass.

THOMSON

LANCASTER COLD ROLLED STRIP

COLD DRAWN FACTS

A Stock List including useful information for users of Cold Drawn Steel—issued on the 15th of every other month and mailed gratuitously upon request.

Write us, giving names of other individuals in your organization whom you wish to receive it.

CARBON AND ALLOY
*Any Analysis
Any Temper*

Lancaster Quality Products

COLD DRAWN

(Rounds-Squares-Hexagons)
Bars and Wire
(Alloy and Carbon)
Screw Stock
(Bessemer and Open Hearth)

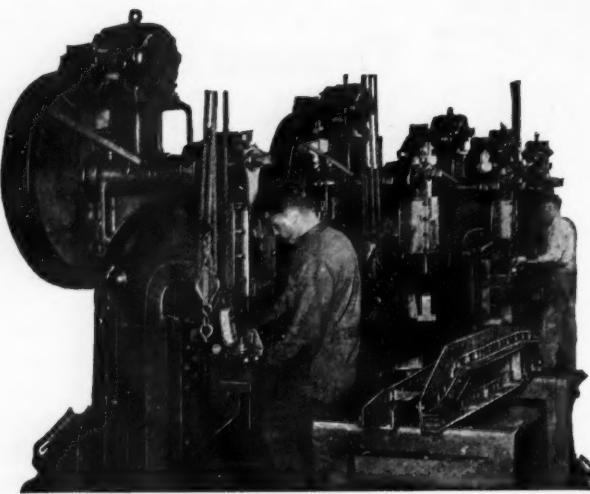
COLD ROLLED

Strip
(Any Analysis-Any Temper)

LANCASTER STEEL PRODUCTS CORPORATION
Lancaster, Pa., U.S.A.

NEW YORK PHILADELPHIA CLEVELAND NEW HAVEN BOSTON SAN FRANCISCO DETROIT

Sheet-metal Riveting— a job for a Bliss Press



Bliss for Machinery

E. W. BLISS CO.

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AND WORKS

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ENGLAND, Pocock St., Blackfriars Rd., S. E., London

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No. 346

BLISS

BROOKLYN, N. Y., U. S. A.



You will find us peculiarly fitted to produce distinctive stampings for your new models—at prices in keeping with to-day's market for cars ~ of all types ~ Estimates on receipt of data

MOTORS METAL MFG. CO.

5936 Milford Ave.

Detroit, Mich.

Fenders, Hoods, Radiator Shells, Dust Shields, Running Boards, Running Board Shields, Gasoline Tanks, Body Stampings



CHEENEY

Grey Iron
CASTINGS



A customer satisfying service—in castings of quality, in their delivery and in their PRICE.

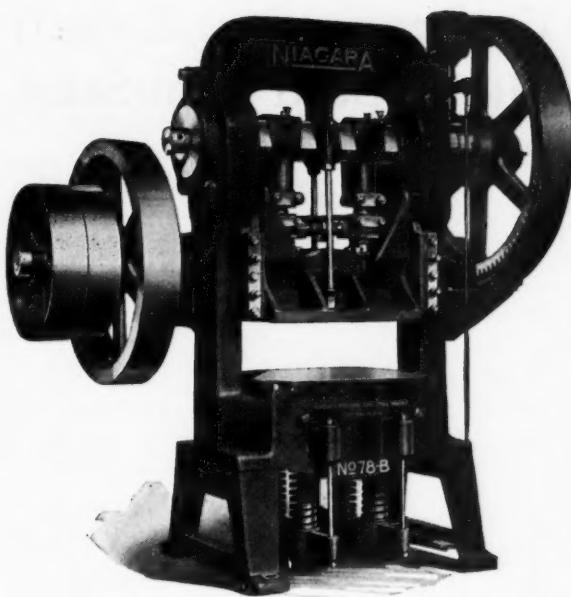
Our specialty for years has been the furnishing of small and medium size castings for the Automotive Industry.

The continued patronage of many leading car and truck manufacturers is the endorsement we offer you.

Estimates cheerfully furnished.

S. Cheney & Son, Manlius, N. Y.

Double Crank Presses



Note large die space.

Niagara Double Crank Presses have a great width between uprights, allowing the use of large dies. They are used for cutting, blanking, forming and embossing sheet metal in the production of round, square, oblong or irregular pieces of considerable area; also for perforating rows of holes, and for operating in one press, a group of progressive dies.

Write for the Bulletins that interest you.

- No. 58—Inclinable Open Back Presses
- No. 59—Bench Power Press
- No. 60—Power Horn Presses and Side Seamers
- No. 61—Power Punching Presses
- No. 62—Power Arch Presses and Open Back, Gap Presses
- No. 63—Straight Sided Single Crank Power Presses and Trimming Presses
- No. 64—Double Crank Power Presses (Built Up Frame)
- No. 65—Double Crank Power Presses (One Piece Frame)
- No. 66—Toggle and Cam Presses
- No. 67—Power Punches, single, multiple, etc.
- No. 68—Foot Operated Presses
- No. 70—Power Rotary Shears
- No. 71—Power Squaring Shears (Light)
- No. 72—Power Squaring Shears (Medium)
- No. 73—Power Squaring Shears (Heavy)

NIAGARA MACHINE & TOOL WORKS

ESTABLISHED 1879

BUFFALO, N. Y.

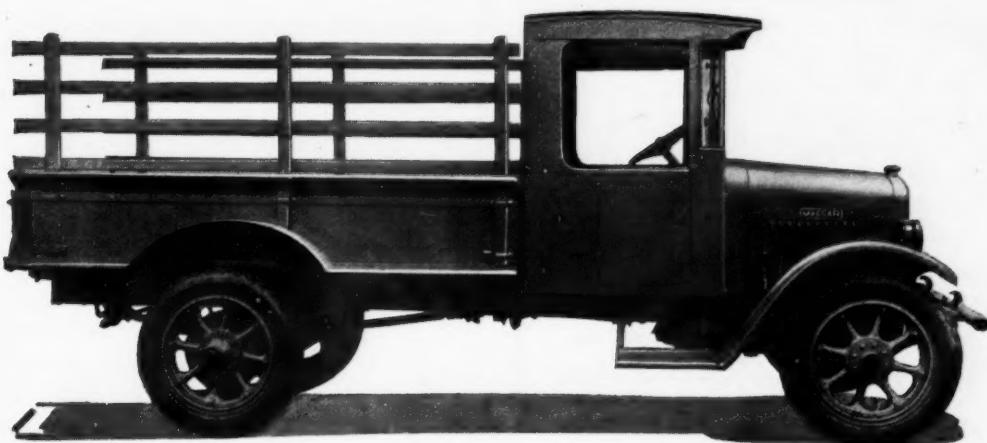
Philadelphia Office, 617 Harrison Bldg.

U. S. A.

Pittsburgh Office, 1426 Park Bldg

NIAGARA

SHEET METAL WORKING MACHINES & TOOLS



Another Well-known Truck on Which Weatherproof Cabs Are Standard

MAC-CAR AND WEATHERPROOF

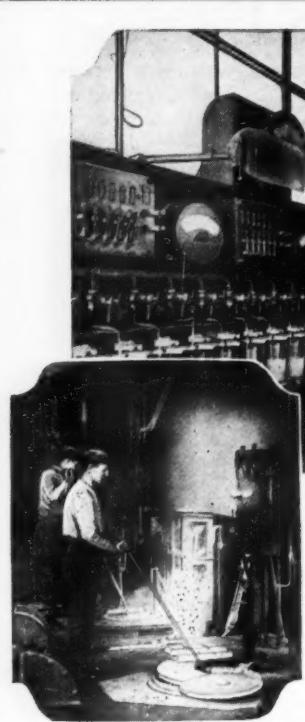
The great loyalty of Mac-car owners is a splendid asset which, we trust, Weatherproof cabs have helped to earn at least in some small measure.

Weatherproof
Body
Corporation

WeatherProof

468 Shiawassee St.
Corunna
Michigan

Builders of Truck Cabs, Bus Bodies, Automobile Tops, Passenger and Commercial Bodies



*Let Scovill
make it of BRASS!*

Consider the use of BRASS for making these parts:

Screws
Reflectors
Radiator and Hub Caps
Tail and Stop Lights
Hinges
Handles
Hood Fasteners
Gas Tanks
Carburetors
Parts for Motors, Generators, Magnets, etc.
Dash Equipment Instruments, etc.

Send your Blueprints and Specifications!

For hundreds of parts on the modern automobile, that are exposed to the elements, and likewise for various parts used in the making of accessories, no metal takes the place of brass—if you would build for permanence—if you would build against rust destruction.

Brass is the visible evidence, to the car and accessory buyer, of the manufacturer's effort to give the best value.

We offer a most complete brass goods manufacturing service. Our unusual facilities enable us to meet your requirements to the most exacting specifications, for finished or semi-finished brass goods in quantity.

SCOVILL MFG. CO.
(ESTABLISHED 1802)
WATERBURY, CONN.
Atlanta Boston New York Philadelphia Cleveland Los Angeles Chicago San Francisco
MEMBER, COPPER & BRASS RESEARCH ASSOCIATION

SCOVILL BRASS—is melted in electric furnaces and laboratory tested. High quality maintained always.

Carpenter Star-Zenith High-Speed Tool-Steel



When you buy CARPENTER STAR-ZENITH HIGH-SPEED TOOL-STEEL, you profit through our experience of thirty-five years in the art of making fine tool-steels.

STAR-ZENITH—constantly improved as demands of service increase—has a wide range of hardening-temperatures which adapts it for both heavy-duty and delicate finishing tools.

Complete stocks carried in our warehouses:

CHICAGO CLEVELAND DETROIT HARTFORD
INDIANAPOLIS READING

THE CARPENTER STEEL COMPANY
READING, PA.

DETROIT TIRE CARRIER

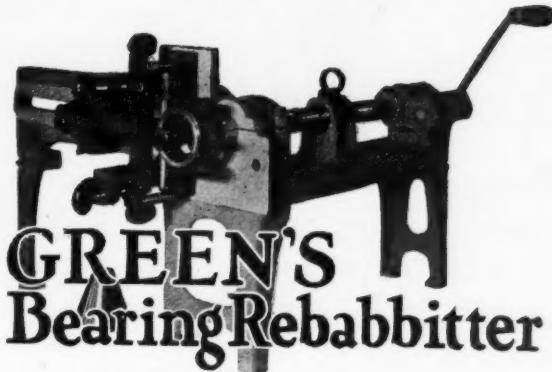
CARRIES BALLOON EQUIPMENT AS EASILY AND READILY AS STANDARD EQUIPMENT

NO STRAPS OR METAL PARTS TO CHAFE THE TIRES



DETROIT CARRIER & MFG. CO.
DETROIT, U. S. A.

The Ideal Machine for Your Service Stations

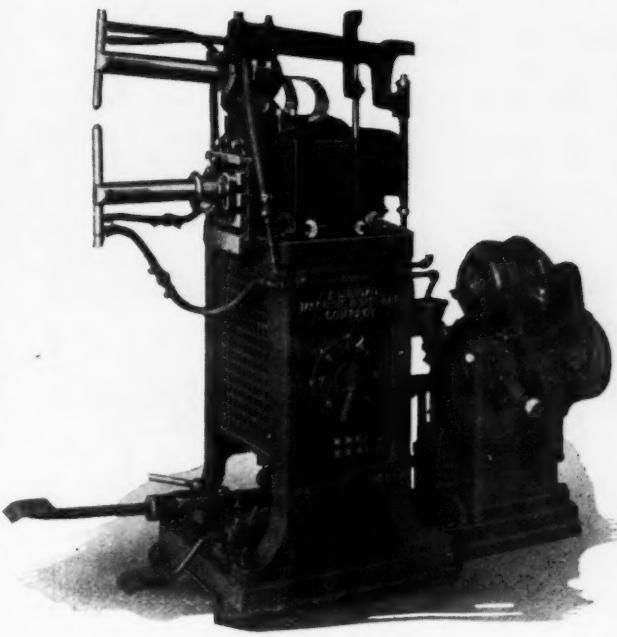


GREEN'S Bearing Rebabitter

Any recommendation that the manufacturer may make to his dealers toward increasing the promptness and efficiency of their service, redounds to the credit of the car itself and its manufacturer. That is why "GREEN'S" Bearing Rebabitter is receiving such wholehearted endorsement.
Handles every type of bearing.
Requires no skilled labor.
Bores out bearings to mirror-like finish,
eliminating old hand scraping method.
Cuts high cost for both customer and service station.
Replaces piston aligning machine.
Complete descriptive booklet awaits your request.

John Green & Sons, Inc.
225 N. Market St. Hoopeston, Ill.

Wherever a Wheel Turns—
OIL and



Automatic or Foot-operated as you like

This is the Federal Junior Spot Welder arranged for motor drive. This machine can be used as a straight foot operated machine or by merely tripping a small treadle at the side of the machine, this engages a clutch and puts the automatic features into operation.

There is supplied as part of the regular equipment a gear-box which is equipped with Timken Bearings and steel gears throughout. This gear-box gives six speeds, making possible 60 to 120 spots a minute.

The electric motor regularly supplied is a $\frac{3}{4}$ h.p. 3-phase, 60-cycle.

This machine, and all other Federal "Juniors" is fully covered in our latest Bulletin 250 which will be mailed upon request. Better yet, let us furnish you with a production estimate from your blueprints.

Federal

The FEDERAL MACHINE & WELDER CO.
Warren, Ohio

Branches in twelve principal cities.



When Union
Drawn Steels
are specified
~ quality and
service are
naturally
anticipated



UNION DRAWN STEEL COMPANY

Warehouses: New York Philadelphia Chicago
Cincinnati Detroit

Sales Offices: Boston Buffalo Cleveland
Milton Pray Co.: Los Angeles, San Francisco, Seattle

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BEAVER FALLS ~ PA



Dependable

If you are looking for a dependable source of either Seamless or Welded Steel Tubing, you would find our product meeting your requirements to the fullest extent.

Prices quoted promptly on request.

GLOBE STEEL TUBES CO.

Milwaukee, Wis., U. S. A.

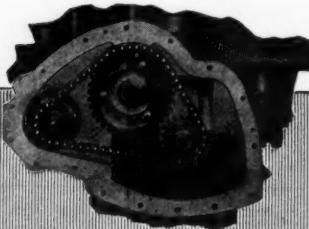


"WHITNEY" SILENT CHAINS

A chain driven motor is no better than the chain that drives it. Therefore, select only the most durable.

"Whitney Silent
High Mileage Chains"

are more satisfactory to the car owner because of their greater dependability and far greater mileage.



THE WHITNEY MFG. CO.
Hartford, Conn.

A PRODUCTION FACTOR

A "chemically clean" metal surface is the basis of a lasting finish whether it be a enamel, japan or plate.

For this reason automotive manufacturers have long shown a preference for the

Wyandotte Metal Cleaners



because their use not only insures a "chemically clean" surface but also greatly increases production at a saving of time, labor and cleaning cost.

Ask your supply man or Write

THE J. B. FORD COMPANY

Sole Manufacturers

Wyandotte, Michigan

Built in 11 sizes to meet every modern need

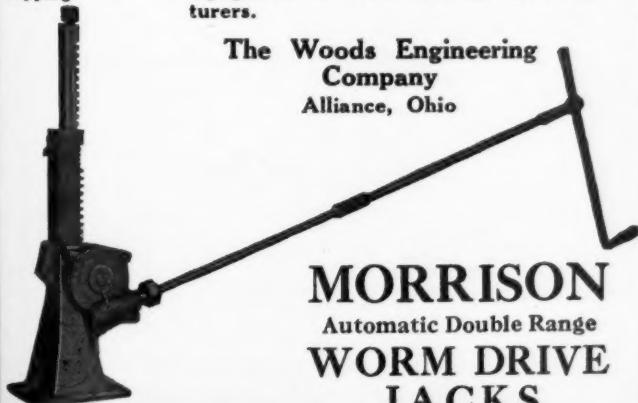
For any car, truck or bus up to 8 tons there's a MORRISON JACK particularly fitted to the job.

Balloon tires and long overhanging bodies present no problem. The MORRISON has a double range lift and long folding handle that operates from standing position.

Vanadium Steel gears—ball bearings—machine cut parts. Every detail perfected.

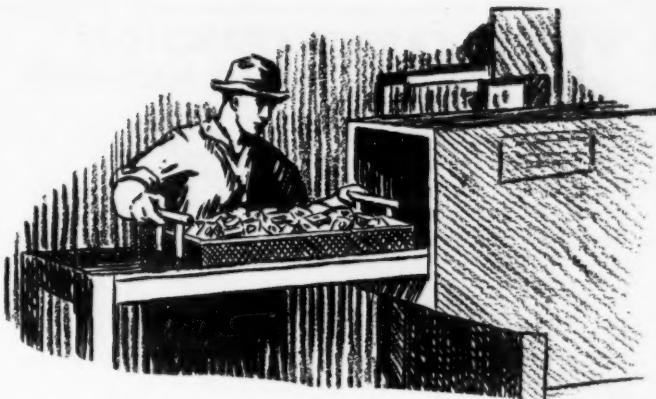
MORRISON JACKS are standard equipment of more than 50 manufacturers.

"Sure hold"
Steel flexible
cap prevents
slipping



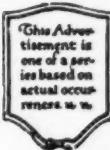
The Woods Engineering
Company
Alliance, Ohio

MORRISON
Automatic Double Range
WORM DRIVE
JACKS



Costs Less to Use

17 lbs. Oakite does work
of 250 lbs. sal soda



THIS plant cleans 1,000 baskets of small steel parts daily in a washing machine. Formerly employed sal soda for making up cleaning solution. It took 250 lbs. of sal soda every week to do the work.

An Oakite Cleaning Specialist showed the foreman how to save money by using Oakite, the emulsifying cleaner. After a week's run—6,000 baskets of parts—it was found that only 17 lbs. of Oakite had been used. Since cleaning with Oakite, the cost of the cleaning solution is now only one-third the former figure.

You too can save money by using Oakite. Give us an opportunity to prove this. Just tell us you are interested in cutting your cleaning costs. We will have an Oakite Cleaning Specialist call at once. There's no obligation. Get off a postal card to us today.

There are 70 Oakite Service Men, cleaning specialists, located at

Allentown, Pa., *Atlanta, Ga., Baltimore, Boston, Bridgeport,
*Brooklyn, Buffalo, Camden, Canton, O., Charlotte, N. C., *Chicago,
*Cincinnati, *Cleveland, *Dallas, *Davenport, Dayton, *Denver,
*Des Moines, *Detroit, Erie, Flint, Mich., Grand Rapids, Harrisburg,
Hartford, *Indianapolis, *Kansas City, *Los Angeles, *Milwaukee,
*Minneapolis, *Montreal, Newark, New Haven, *New York,
*Oakland, Calif., Peoria, Philadelphia, Pittsburgh, Portland,
Me., Poughkeepsie, Providence, Reading, Rochester, Rockford, Rock
Island, *San Francisco, Schenectady, *Seattle, *St. Louis, Syracuse,
Toledo, *Toronto, Utica, *Vancouver, B. C., Waterloo, Ia.,
Williamsport, Pa., Worcester.

*Stocks of Oakite Materials are carried in these cities

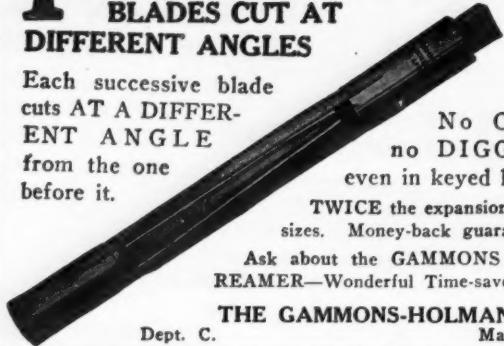
Oakley Chemical Co. General Offices: 28 Thames St., New York, N.Y.

OAKITE
Trade Mark Reg. U. S. Pat. Off.

Industrial Cleaning Materials

PAROB EXPANSION HAND REAMER

BLADES CUT AT DIFFERENT ANGLES



Each successive blade cuts AT A DIFFERENT ANGLE from the one before it.

No CHATTER, no DIGGING IN— even in keyed holes.

TWICE the expansion of others. All sizes. Money-back guarantee.

Ask about the GAMMONS TAPER PIN REAMER—Wonderful Time-saver.

THE GAMMONS-HOLMAN CO.
Manchester, Conn.
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WIRE IGNITION AIRPLANE SPRINGS

Everything in Wire
Send for Descriptive Catalogues

American Steel & Wire Company

CHICAGO
NEW YORK
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U. S. STEEL PRODUCTS CO.

**L Automobile
A M P S
of
Distinction**



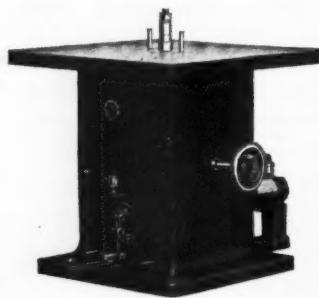
No. 602

THE JNO. W. BROWN MFG. CO.
COLUMBUS, OHIO, U. S. A.

QUALITY SNAP RINGS



The Crescent Ball Bearing SINGLE SPINDLE SHAPER



is built for hard, continuous service. It will satisfy the more exacting shaper users and will be appreciated by those who demand greater efficiency and smoothness of operation.

Send today for special circular giving complete description.

The
Crescent Machine Co.
604 Cherry Fork Ave.,
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FOURTH Point
of the Clemson STAR



STAR HACK SAWS

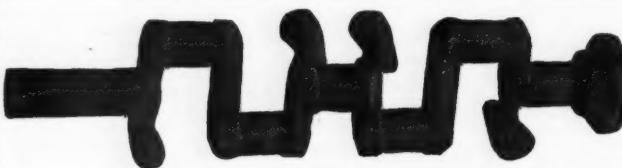
CLEMSON SET

Star Hack Saw Blades possess a balanced set, consequently their natural tendency is to saw straight. Star Blades are absolutely set to specification.

Makers since 1883

CLEMSON BROS., Inc.
Middletown, N. Y.

We have something to tell you about Hack Saw Blades. Write for booklet.



COUNTER-BALANCED CRANK SHAFTS

And HEAVY DIE FORGINGS

The Park Drop Forge Co.
Cleveland, Ohio

'CARNEGIE' FLYWHEEL BLANKS ALLOY STEEL

SPECIAL BODY SECTIONS.
BRAKE DRUM FORGINGS

Carnegie Steel Company
PITTSBURGH, PENNA.



Light Stampings in any Quantity

We have modern facilities for light stampings in brass or steel from die work to completion. Small drawings and stampings—unfinished or nickel plated. Let us quote.

We also specialize on Porcelain Enamel Dials. Prices unusually attractive. Estimates cheerfully furnished.

The Cooper Oven Thermometer Co.
Pequabuck, Connecticut

The Bearings Co. of America LANCASTER, PENNA.

Manufacturers of
Angular Contact Radial Bearings
Angular Contact Thrust Bearings
Thrust Ball Bearings

All Bearings made to your requirements and Blue Print dimensions. Your present Bearing sizes duplicated.



Detroit, Mich., Office
1012 Ford Bldg.

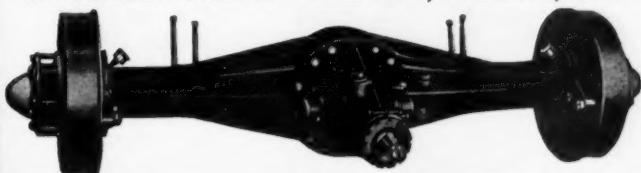
Wisconsin Axles

for Trucks, Buses and Coaches
Gasoline Railcars and Trackless Trolleys

These heavy duty axles met with success from the beginning. So true is this, that other makers have for some time attempted to duplicate their design—the most sincere type of flattery.

Made in Single Reduction, Double Reduction and Worm Drive Types.

WISCONSIN PARTS COMPANY, Oshkosh, Wis.



STAMPINGS

HOODS
FENDERS
RADIATORS
TANKS
TOOL BOXES
Etc.

Send your blueprints and specifications for estimates.

York Corrugating Co.
York, Pa.

Any Size or Description



Drop forgings Delivered When Promised!

Any Type of Drop Forging up to 300 lbs. in weight

Any Analysis of Steel Heat Treated Where Desired

Complete Laboratory and Heat Treat Equipment

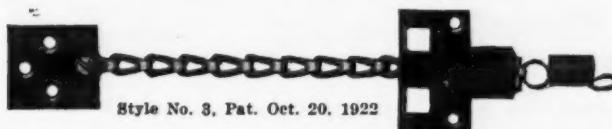
Send Us Your Inquiries

Union Switch & Signal Co.
Drop Forge Division
Pittsburgh District
Swissvale, Pa.

Typical SS Forging



CONCEALED DOOR CHECKS Are a Production Economy



Style No. 3, Pat. Oct. 20, 1922

Simple to apply, this style is moderate in price. Made of selected materials, chain, friction block, springs and channel will outlast the car. Adding to the mechanical completeness of your models, its use will give your sales department additional ammunition. For closed and open models, four styles.

Write for complete illustrated catalog

The Concealed Door Check Co., Inc.
Kokomo, Indiana, U. S. A.

LADISH, L QUALITY DROP FORGINGS

An increasing number of manufacturers of the better class of motor cars, trucks and tractors use LADISH Drop Forgings each year, because we analyze their requirements correctly, and produce forgings to meet them—promptly and correctly.

LADISH DROP FORCE COMPANY
Cudahy (Suburb of Milwaukee) Wisconsin

Maximum Strength Minimum Weight

Vanadium Steel
The Master Alloy

Vanadium Corporation of America
120 Broadway
New York

Book Building
Detroit

High Production
Without Sacrificing Accuracy

DETROIT CENTERLESS GRINDER
Is guaranteed to grind work that will pass a ring gauge test.
Send us samples or blue prints for production estimates.

DETROIT MACHINE TOOL COMPANY
6547 St. Antoine St. Detroit, Mich.



GENUINE
BOSCH
Products bear this Trade Mark
American Bosch Magneto Corporation
Main Office and Works: Springfield, Mass.
Branches: New York, Chicago, Detroit, San Francisco.
500 Service Stations 1600 Official Dealers

Trade Mark Reg.
U. S. Pat. Off.

MACHINE SCREWS

Square and Hexagon
Machine Screw Nuts
"Promco" Quality Brand
Manufactured by
The Progressive Manufacturing Co.

Torrington, Conn., U. S. A.



Pneumatic Tools
Air Compressors - any size or type.
Condensers, Pumps, Oil Engines.

INGERSOLL-RAND CO.
11 Broadway. New York, N.Y. 272 PT

DAVIS Key-Seaters AND CUTTERS

for cutting internal keyways. Does not use a circular cutter, but operates like a broach. Faster, more economical. Made in two sizes. Catalog.

DAVIS KEYSEATER CO.
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POLISHING BUMPERS

We lay out, furnish and install everything from the bare floor to the last process, and, if desired, will furnish competent engineers to start the work right and put you on a proper production basis.

Divine Brothers Company, Polishing Engineers, Utica, N. Y.

WE HAVE BEEN DOING THIS FOR 30 YEARS.

The whole polishing business is in such vague condition that many large concerns have found that it paid them to have our engineers standardize their processes.

The LAIDLAW COMPANY, Inc.

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New York City

Detroit Chicago San Francisco

Top Coverings
Slip Cover Cloths
Curtain Silks
Carpets
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Closed Car Roofing Materials

"AETNA"

Thrust Ball Bearings

Automotive Thrust Ball Bearings to Your Specifications.
AETNA BALL BEARING MANUFACTURING CO.
2745 High St. Chicago, Ill.



HARTFORD SCREW MACHINE PRODUCTS

HARTFORD MACHINE SCREW COMPANY
Hartford, Conn.
Screw Machine Specialists for 50 Years

HIRST-ROGER COMPANY

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Detroit Representative
Joseph H. Austin Co.
New York Representative
Chas. Scotton & Co.
17 W. 60th St.

Quality carpets that retain their pile and beauty and freshness even under abusive treatment.



U. S. MULTIPLE DRILL HEADS

Send us prints of your drilling operations.

U. S. Drill Head Co.
1946 W. 6th Street
Cincinnati, O.

ELWELL-PARKER TRUCTORS

Sturdy electric industrial haulage units for automotive manufacturing and assembling plants. Orane, tractor, platform or lift trucks for transferring, stacking or tiering materials.

Request Catalogue 520.
The Elwell-Parker Electric Company, Cleveland



The ROCKFORD

HEAVY DUTY HORIZONTAL BORING AND DRILLING MACHINES

Tell us your production requirements, and we'll be glad to show you what the Rockford will do for you.
THE ROCKFORD DRILLING MACHINE CO.
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IN ALL GRADES

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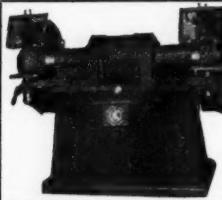
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2154-V

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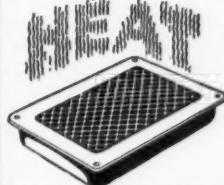
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Globe H.C. Chilled Shot cuts cleaning costs in half
One ton of Globe Shot will do more and better work than a whole carload of sand. Furthermore, much labor is saved—and storage bins and dryers are eliminated. Samples and prices upon request.
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ASH-WHEELS, embodying the advantages of construction which have made Ash Wire Wheels favorites on large cars, are now available for Fords, Chevrolets, Overlands, Stars and Grays.

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Westinghouse

An advertisement for Schatz Universal Ball Bearings. The top half features the brand name "Schatz" above "UNIVERSAL" in large, bold, serif letters. Below "UNIVERSAL" is the word "Annular" in a smaller, italicized font. To the left of "Annular" is the registered trademark symbol (®) and the word "Ball Bearing". To the right is the U.S. Patent Office (U.S. Pat. Off.) logo. The bottom half contains the company name "The Federal Bearings Co., Inc." and its location "Poughkeepsie, N. Y.". To the right of the text is a detailed technical illustration of a ball bearing's cross-section, showing the inner ring, outer ring, and the annular row of balls.

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AND
STRAINERS**
AND
LIGHT AUTOMOTIVE STAMPINGS

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Gentlemen: Send your free booklet containing a plain talk by a master mechanic on the Keystone Manifold Safety System of Keystone Grease Lubrication.

Name

Address

The Sessions Foundry Company
Manufacturers of
Gray Iron Castings
From Smallest up to 30 tons each
Bristol Since 1879 Connecticut

An advertisement for Cowles Cutters. It features the company name 'COWLES CUTTERS' in large, stylized, serif capital letters. To the left of the name is the text 'Special Tools' and to the right is another 'Special Tools'. Below the main name, the slogan 'Milling Cutters for Every Job' is written in a bold, sans-serif font. At the bottom, the company address 'COWLES TOOL COMPANY Cleveland, Ohio : U. S. A.' is provided.

An advertisement featuring a large, detailed black-and-white photograph of a single machine screw. The screw has a flat head on the left and a threaded shank extending to the right. To the right of the screw, the word "About" is written in a cursive script font, followed by "better machine screws" in a bold, sans-serif font. Below this, a block of text reads: "See our 1/2-page advertisement in last week's issue." At the bottom, the company name "HARVEY HUBBELL, Inc., Bridgeport, Conn." is printed in a bold, sans-serif font.

The image is a black and white advertisement for "THE ACKLEY STAMPING CO.". At the top, the company name is written in a large, bold, serif font with a decorative underline. Below the name are two circular objects: one is a dark, textured circle with three holes, and the other is a lighter-colored piggy bank with a coin slot. In the center, the word "STAMPINGS IN" is written above three lines of text: "STEEL", "BRASS", and "ALUMINUM". At the bottom, the words "TOLEDO, OHIO." are centered.

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High production rates on intricate castings. Aluminum, Zinc, Tin and Lead-base alloys.

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Since 1883

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STAMPINGS

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Increase Production—Improve Quality—Reduce Cost
Our range includes aluminum, tin, lead and zinc base alloys. We quote from sample or blue-print. Send for our two useful booklets.

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Specialty Wanted

Manufacturer with factory and successful experience in making and marketing automotive equipment is open for a specialty to add to their line. Have excellent standing with automobile manufacturers, jobbers and dealers. Personal interviews can be arranged during New York Automobile Show.

SW-612, Automotive Industries
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High Grade Clean
CASTINGS

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Automotive Parts Co.

Ternstedt Manufacturing Co.

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All Maehler Ovens are specially built to fit the product to be handled and production operations.

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The Productimeter
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Production Costs and Overhead!

Unless you know your overhead costs—unless you know exactly what your floor space, equipment, wages, etc., should yield in output—you cannot set an accurate standard of production.

The Productimeter will give you this information easily and accurately; it will tell you whether this standard of production is being maintained. And this information is obtained at a glance, right now, when you need it—not next month, some time.

And the Productimeter will show you how space and labor can be saved, will prevent waste, and conserve materials and time.

Try One 30 Days Free

Tell us where and how you want to use it, and we will send you the right Productimeter for that purpose for thirty days free trial.

DURANT Manufacturing

631 Buffum Street, Milwaukee, Wis.

(3011A)

Index to Advertisers

The Advertisers' Index is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

A

Acklin Stamping Co.	94
Aetna Ball Bear. Mfg. Co.	90
Ahlberg Bearing Co.	93
Alemite Die Casting Co.	94
American Bearing Corp.	92
American Car & Foundry Co.	93
American Felt Company	92
American Forge Co.	93
American Sheet & Tin Plate Co.	91
American Steel & Wire Co.	88
Atwood Vacuum Machine Co.	92

E

Elwell-Parker Electric Co. 90

F

Fafnir Bearing Co.
Front Cover	
Federal Bearings Co., Inc.	94
Federal Machine & Welder Co.	85
Fellows Gear Shaper Co.	54
Fitchburg Machine Works	93
Ford Co., J. B.	87
Formica Insulation Co.	68
Franklin Die Casting Corp.	95
Fremont Foundry Co.	95

G

G. & O. Mfg. Co.	4
Gammons-Holman Co.	88
Gibson Co., Wm. D.	80
Gits Bros. Mfg. Co.	85
Gladiator Mfg. Co.	93
Globe Steel Abrasive Co.	93
Globe Steel Tubes Co.	86
Goodnow & Blake Mfg. Co.	94
Green & Sons, Inc., John.	85
Greenfield Tap & Die Corp.	53

H

Harrison Radiator Corp.	61
Hartford Machine Screw Co.	90
Heald Machine Co.	52
Henry & Wright Mfg. Co.	70
High Speed Hammer Co.	93
Hilo Varnish Corp.	73
Hirst-Roger Co.	90
Hubbell, Harvey	94
Hyatt Roller Bearing Co.	71

I

Ingersoll-Rand Co.
International Nickel Co.	75

K

Keystone Lubricating Co.	94
Kickhafer Mfg. Co.	94
Kinsey & Mahler Co.	95

D

Davis Keyseater Co.	90
Detroit Carrier & Mfg. Co.	84
Detroit Machine Tool Co.	90 and 93
Diamond State Fibre Co.	74-75
Ditzler Color Co.	1
Divine Bros. Co.	90

Index to Advertisers

The Advertisers' Index is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

L

Ladish Drop Forge Co....	89	Schlegel Mfg. Co.....	93
Laidlaw Co., Inc.....	90	Scovill Mfg. Co.....	84
Lancaster Steel Product Corp.	81	Seneca Falls Machine Co.	93
Landis Tool Co.	92	Sessions Foundry Co.	94
Lapointe Co., J. N.	93	Silver Jubilee Automobile Show	74
Light Mfg. & Foundry Co.	91	Soss Mfg. Co.	93
Link-Belt Co.	67	Staynew Filter Co.	94
Lipe, W. C.	91	Sterling Die Casting Co., Inc.	94
Long Mfg. Co....Back Cover		Superior Die Casting Co.	91
Lycoming Mfg. Co.	94		

S

Temple Mall. Iron & Steel Co.	95
Tenstedt Mfg. Co.	51
Thermoid Rubber Co.	90
Thomson Electric Welding Co.	81
Timken-Detroit Axle Co.	63
Timken Roller Bearing Co.	58
Titeflex Metal Hose Co.	80

T

Maehter & Co., Paul....	96
Mar Tan Motor Mfg. Co.	92
Marion Forged Products Co.	94
Meisel Press Mfg. Co.	92
Mitchell Specialty Co.	92
Morse Chain Co.	76
Motors Metal Mfg. Co.	82
Murray Mfg. Co., J. W....	10

Temple Mall. Iron & Steel Co.	95
Tenstedt Mfg. Co.	51
Thermoid Rubber Co.	90
Thomson Electric Welding Co.	81
Timken-Detroit Axle Co.	63
Timken Roller Bearing Co.	58
Titeflex Metal Hose Co.	80

U

N	Union Drawn Steel Co....	86
New Britain Machine Co.	92	
New Departure Mfg. Co.	55	
New Eng. Press. Steel Co.	95	
Niagara Machine & Tool Wks.	83	
Norma-Hoffmann Bearings Corp.	3	

V	Vacuum Oil Co.	93
Vanadium Corp. of Amer.	90	
Van Wheel Corp.	94	

N	Union Drawn Steel Co....	86
New Britain Machine Co.	92	
New Departure Mfg. Co.	55	
New Eng. Press. Steel Co.	95	
Niagara Machine & Tool Wks.	83	
Norma-Hoffmann Bearings Corp.	3	

O	W
Oakley Chemical Co....	87
Otis Steel Co.	57

P	Walden-Worcester. Inc.	91
Packard Electric Co.	77	
Park Drop Forge Co.	88	
Peck Spring Co.	91	
Piston Ring Co.	88	
Powell Muffler Co.	92	
Precision Gear Blank Co.	93	
Progressive Mfg. Co.	90	

O	Walden-Worcester. Inc.	91
Oakley Chemical Co....	87	
Otis Steel Co.	57	

P	Wallace Barnes Co.	80
Packard Electric Co.	77	
Park Drop Forge Co.	88	
Peck Spring Co.	91	
Piston Ring Co.	88	
Powell Muffler Co.	92	
Precision Gear Blank Co.	93	
Progressive Mfg. Co.	90	

R	Warner & Swasey Co.	59
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Waukesha Motor Co.	59
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Second Cover Weatherproof Body Corp.	83
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Western Felt Works....	93
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Westinghouse Air Brake Co.	8
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Westinghouse Electric & Mfg. Co.	94
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Wheeler-Schebler Carburetor Co.	5
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Whitney Mfg. Co.	86
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Wisconsin Motor Mfg. Co.	7
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Wisconsin Parts Company 89	7
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Woods Eng. Co.	87
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

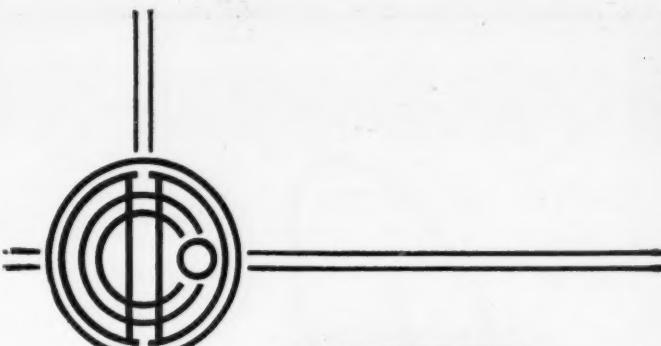
R	Worcester Stamped Metal Co.	95
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	Wyman-Gordon	2
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

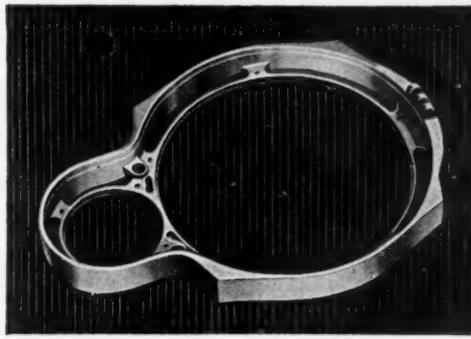
R	Y
Raymond Mfg. Co.	80
Rockford Drilling Machine Co.	90
Rockford Malleable Iron Wks.	92
Rome Mfg. Co.	92
Rome-Turney Radiator Co.	91
Russell, Burdsall & Ward Bolt & Nut Co.	69

R	York Corrugating Co....	89
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	

R	York Elec. & Machine Co.	95
Raymond Mfg. Co.	80	
Rockford Drilling Machine Co.	90	
Rockford Malleable Iron Wks.	92	
Rome Mfg. Co.	92	
Rome-Turney Radiator Co.	91	
Russell, Burdsall & Ward Bolt & Nut Co.	69	



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DOEHLER DIE-CASTING CO.

BROOKLYN, N.Y. TOLEDO, OHIO.

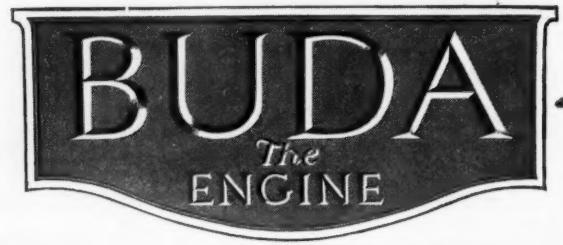
POTTSTOWN, PA. BATAVIA, N.Y.

Coming Soon! Buda "G L 6"

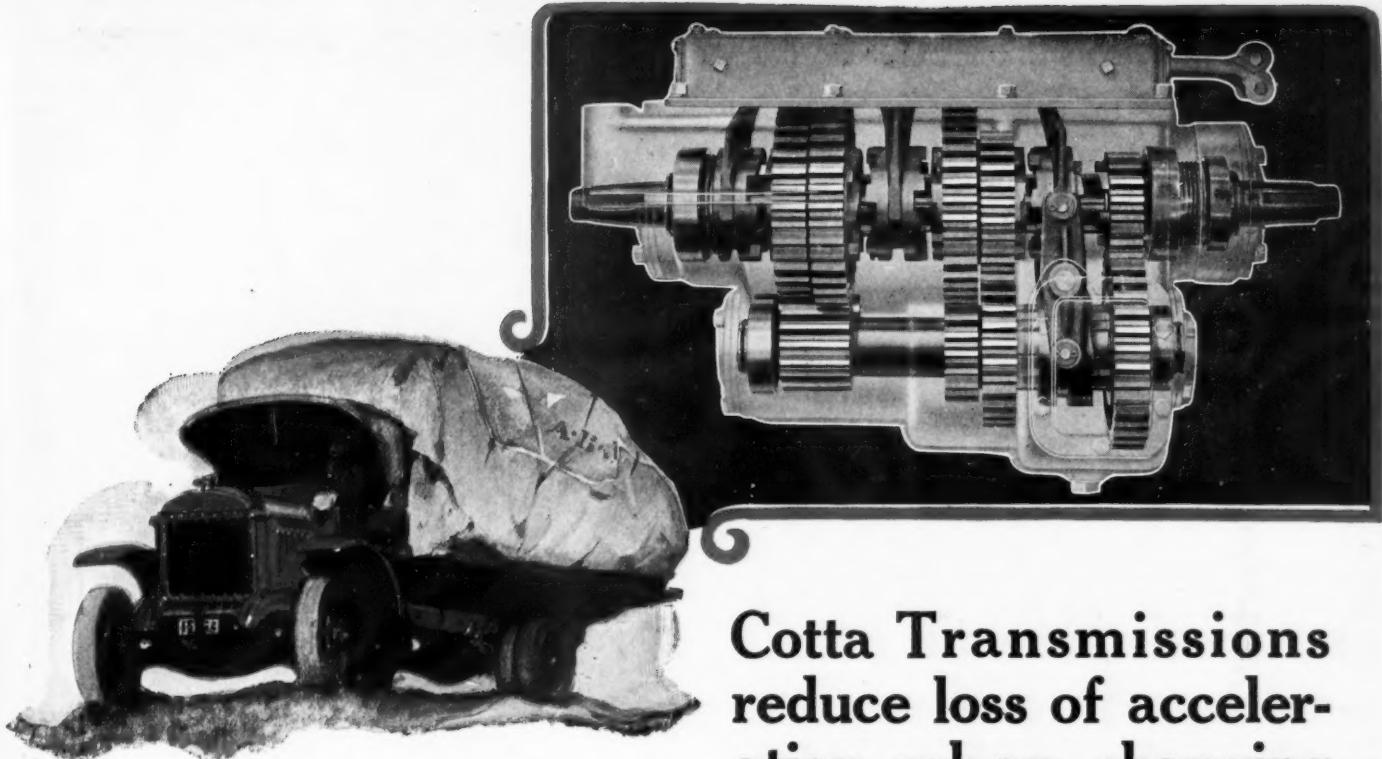
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Cotta Transmissions reduce loss of acceleration when changing speed

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Tests have shown that the instant speed change possible with the "Cotta" reduces strains on the engine, makes it easier to handle vehicles in traffic, increases the miles per hour where stops are frequent and saves an appreciable amount of operating expense.

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